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Non-academic factors as predictors of success in the first year of an undergraduate nursing course

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NON-ACADEMIC FACTORS AS PREDICTORS OF SUCCESS IN THE FIRST YEAR OF AN UNDERGRADUATE NURSING COURSE

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I certify that the work contained in this thesis has not been submitted for a degree to any other university or educational institution. The thesis contains entirely my work.

Signed

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ABSTRACT

Academic entry qualifications of nursing students have been shown to be unsatisfactory in the prediction of academic success in undergraduate nursing courses. For many students, non-academic factors will be extremely important for academic success. Therefore, in this study, non-academic factors and their relationship to academic performance in the first year of an undergraduate nursing course were investigated. The study uses quantitative methodology to investigate this relationship. The non-academic factors were grouped into categories: demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy. Bandura's (1977; 1986) theory of self-efficacy was used to develop a research tool.

A student cohort of first year undergraduate nursing students at the University of Wollongong was surveyed. The research instrument incorporated various tools including: Attitudes to Nursing (AN), Bem Sex-Role Inventory (BSRI), Attitudes to Feminism, Self-Efficacy for First Year Subjects (SEFFYS), Self-Efficacy for Course Completion (SECC) and the Self-Efficacy for Science (SS). The AN and SS were researcher-developed tools, designed to predict first year students' academic performance in an introductory nursing and two science subjects, respectively, of an undergraduate nursing course.

Academic performance was determined by students' academic marks/grades for subjects. Grade Point Average (GPA) and Weighted Average Mean (WAM) were calculated to give a measure of students' overall academic performance. The statistical techniques employed in the study were: the Spearman-Rank Order Correlation, Chi-Square test, t-test, Wilcoxon signed-ranks test, Analysis of Variance, Kruskal-Wallis test, and Principal Component Factor Analysis.

Nursing as a first choice, AN, SEFFYS and SS were related to academic performance in the first year introductory nursing subject. Students' BSRI Femininity scores, SS and SEFFYS were related to academic performance in the two science-based first year subjects. A student's SEFFYS and interest in that subject were related. Students' mother's occupation was related to overall academic performance. The SS could predict 18-24% of students' academic performance in the science-based subjects. For male students it could predict 56-62% of academic performance. The SS could also predict students' overall academic performance and was a better predictor than their TER scores.

The SS could be used to identify students who will have difficulties with the science component of a course, subsequently reducing their failure rate and attrition from a nursing course.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

CHAPTER ONE

INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 Introduction

Until the early 1970s nursing education in Australia was conducted in hospital-based Schools of Nursing. These Schools of Nursing were required to meet State Nurses Registration Board educational standards in relation to the syllabus, curriculum hours, students' entry qualifications and essential practical nursing experiences. Nursing students were employed full-time by a hospital, for which they were paid a salary, and trained for registration as a nurse. Registration as a General Nurse was contingent upon success in an external registration examination(s) and completion of the required practical nursing experience.

Due to a multiplicity of reasons, such as the lack of correlation between theory and relevant practical nursing experience, widespread dissatisfaction with this apprenticeship system of nursing education gained momentum during the 1960s and 1970s (Russell, 1988). Educational reform was advocated with the integration of nursing into the tertiary education system becoming the ultimate goal of the profession (Russell, 1988; Marquis, Lillibridge & Madison, 1993).

Nursing education entered a new phase when the first college-based nursing course commenced in Victoria in 1974 at the College of Nursing Australia (Mackay, Brooke & Bruni, 1981). However, it was not until 1980 that the High School Certificate or mature age entry became mandatory in NSW for nursing students (Watson, 1987). With the introduction of entry requirements comparable to students entering tertiary institutions, nursing took an important step toward the achievement of the goal of tertiary education for all nurses.

In 1984, the Australian Government announced it would support the complete transfer of nursing education from hospital Schools of Nursing to tertiary educational institutions. This transfer was to prepare "a more appropriately educated, flexible and career orientated registered nurse" who would be "able to meet the current and future nursing needs of the Australian community" (Commonwealth of Australia, 1990, p1).

Subsequently, new intakes of nursing students to NSW hospital-based Schools of Nursing ceased in 1985 (Wright, 1988; Marquis et al, 1993). Nursing education in NSW was initially transferred to colleges of advanced education and then to universities. However, it was not until 1993 that all states and territories achieved the goal of tertiary education for all nursing students.

Currently, students in NSW complete a three year tertiary nursing course. After successfully completing the designated subjects and achieving required clinical competencies, a student is awarded a baccalaureate degree in nursing. The student may then apply for registration as a nurse.

A crucial element in the selection process for any educational programme is the selection of students with the ability to succeed in that course. Selection for undergraduate nursing courses in NSW is based on the aggregate marks known as the Tertiary Entrance Rank (TER) score which is derived from the High School Certificate (HSC) and places are primarily allocated on a competitive basis. English is the only high school subject mandatory for admission to an undergraduate nursing course in NSW. Thus, individual nursing students entering a tertiary institution can vary widely in the subjects they have studied in high school.

This variability, combined with the perception of nursing students having difficulties with science subjects at university (Bishop, 1990; Caon & Treagust, 1992), has led Australian researchers to focus on students' entry qualifications. This has particularly concerned science/biology subjects and their relationship to academic success in nursing (Bishop 1990; Caon & Treagust, 1992; Kershaw,1989).

Academic entry qualifications may be a predictor of success in tertiary institutions, for some nursing students (Caon & Treagust 1992; Dell & Valine, 1990; Horns, Goodman & O'Sullivan, 1991; Waterhouse, Caroll & Beeman, 1993; Wold & Wirth 1990). However, there remains a significant group of students whose academic success is not related to their academic entry qualifications, and therefore it is difficult to predict their academic outcomes in tertiary institutions. Motivation has been suggested as one possible explanation for students' academic achievements (Bishop, 1990; Higgins & Leelarthaepin, 1986; Mills, Sampel, Pohlman & Becker, 1992).

Bandura's (1977; 1986) concept of self-efficacy may be defined as a belief or expectation about one's ability to successfully perform a particular task or behaviour. It is a concept concerned with the issues of how people judge their capabilities to perform a task or behaviour. Consequently, self-efficacy theory draws on psychological, environmental, intellectual and social processes to understand the influences on self-efficacy expectations and how the individual's perception of self-efficacy affects their motivation and behaviour.

As undergraduate nursing students are most likely to be female, single and aged between 17-20 years (Burgum, Martins & Northey 1993; Neill & Barclay, 1989; Wright, 1988; Wright & Frew,1991), it can be said that nursing appears to have remained a traditional occupational choice for females. Whilst first year undergraduate nursing courses will certainly include introductory nursing subjects, a student may also be required to study science (chemistry, biology and physics) research methods, psychology and sociology subjects.

Some subjects have a masculine image, and the presence of research and science-based ("masculine") subjects may present a dichotomy to nursing students entering a "feminine" occupation.

The relationship between students' (specifically women's) self-efficacy for mathematics and a science-based career choice have been investigated (Betz & Hackett, 1983; Hackett, Betz, O'Halloran & Romac, 1990; Lent, Lopez & Bieshke, 1991). It has been demonstrated that women have lower self-efficacy than men for mathematics and science-based careers.

By measuring a student's self-efficacy for science, it may be possible to predict their academic performance in the science areas of an undergraduate nursing course.

1.2 Statement of the Problem

Whilst entry qualifications may be a predictor of success in tertiary institutions for some students (Caon & Treagust, 1992; Dell & Valine, 1990; Horns, Goodman & O'Sullivan, 1991; Waterhouse et al, 1993; Wold & Wirth, 1990), there is a significant group whose academic success is difficult to predict (Bishop, 1990; Higgins & Leelarthaepin, 1986; Mills et al, 1992). Motivation has been suggested as a possible explanation for students' academic performance in undergraduate nursing courses (Bishop, 1990; Higgins & Leelarthaepin, 1986; Mills et al, 1992). Bandura's (1977; 1986) theory of self-efficacy may be a way of investigating motivation and its effect on academic performance.

1.3 Rationale for Study

Students' entry qualifications or academic factors have been the focus of a number of Australian studies investigating the academic success of students in undergraduate nursing courses. Few studies have examined non-academic factors, particularly self-efficacy, and their relationship with success in an undergraduate nursing course.

Therefore, it is proposed to examine the relationship between various non-academic factors and academic performance in the first year of an undergraduate nursing course. These non-academic factors will include: demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy/motivation. This research could advance our understanding of the many factors that influence a student's performance during the first year of an undergraduate nursing course. The findings may then be applied to the selection, performance-expectations and course retention of students.

1.4 Aim of the Study

The purpose of this study, then, is to identify non-academic factors and examine whether any relationship exists between them and academic performance in the first year of an undergraduate nursing course. It is also proposed to establish whether Bandura's (1977; 1986) theory of self-efficacy can be used in the prediction of students' academic performance, particularly the science subjects of the curriculum.

1.5 Research Hypotheses

1.5.1 Introduction

The main research hypothesis in this study is that non-academic variables are predictors of academic performance in an undergraduate nursing course. The research sub-hypotheses are listed under the non-academic categories: demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy.

1.5.2 Demographic Data

(1) That males and females have different self-efficacy strengths for science.

(2) That students with parents born overseas (excluding UK/NZ) perform better in first year subjects than students with parents born in Australia/UK/NZ.

(3) That a student's age is related to academic performance.

(4) That students with "mature-age/other" entry to the course perform better academically than school leavers.

(5) That a student's marital status is related to academic performance.

1.5.3 Social Characteristics

(6) That students from lower socio-economic backgrounds perform better academically than students from higher socio-economic backgrounds.

(7) That females from single sex-schools have a higher self-efficacy for science than females from co-educational schools.

1.5.4 Vocational Choice

(8) That students who choose the course as a first preference perform better academically in NURS121 than those for whom it was not a first choice.

(9) That students' reasons for choosing nursing are related to their attitudes to nursing.

(10) That students' attitudes to nursing are related to academic performance in NURS121.

1.5.5 Gender Characteristics

(11) That students' BSRI Masculinity scores are related to self-efficacy for science.

(12) That students' BSRI Masculinity scores are related to self-efficacy for SCIE111 and NURS124.

(13) That a student's BSRI Masculinity score is related to academic score for SCIE110, SCIE111 and NURS124 ("masculine-typed" subjects).

(14) That students' with a high BSRI Femininity score achieve lower academic grades in SCIE110, SCIE111 and NURS124.

(15) That students' BSRI Femininity scores are related to self-efficacy for NURS121.

(16) That, for female students, a positive attitude to feminism is related to BSRI Masculinity score .

1.5.6 Self-Efficacy

(17) That a student's self-efficacy for science is related to academic performance in science-based first year subjects (SCIE110, SCIE111).

(18) That students with better grades in HSC science subjects also have higher self-efficacy for science.

(19) That students who have failed SCIE110 have a low self-efficacy for SCIE111.

(20) That a student's self-efficacy for second (Spring) session subjects is related to academic performance in that subject.

(21) That self-efficacy for a subject is related to a student's degree of interest in that subject.

(22) That students who chose nursing as a first choice have a strong self-efficacy for course completion.

1.5.7 Null Hypothesis

That non-academic variables are not predictors of academic performance in the first year of an undergraduate nursing course.

1.6 Limitations of the Study

As the non-academic factors relating to only one cohort of undergraduate nursing students were examined, generalisations may not apply to other cohorts.

The number of males in the cohort was small, therefore interpretations of gender differences should be made with caution.

Not all female students gave consent for the collection of their academic results.

Whilst the BSRI (Bem Sex-Role Inventory) is a useful tool for assessing the sex-role identity of males and females, it has limitations because it was constructed with reference to American norms. This also applies to the Attitudes to Feminism tool used in the study.

The SS (self-efficacy for science) and AN (attitudes to nursing) are newly-developed tools specifically designed for undergraduate nursing students, and require further validation studies with other cohorts of undergraduate nursing students.

1.7 Definition of Terms

Academic performance relates to measures used to assess a student's academic outcomes in first year subjects. Hence the term encompasses grade or mark (score) obtained for a subject and derived measures of overall academic performance: the Grade Point Average (GPA), Weighted Average Mark (WAM) and Average Mark (AM). These measures are discussed in Chapter Three.

Self-efficacy is measured as the strength of one's beliefs about one's ability to perform a task or behaviour.

The term "cohort" refers to all the students enrolled in NURS121 who completed the questionnaire (that is 81 students). The term "in the study" refers to students who gave permission for the collection of their academic grades (that is, 66 students).

Other terms and abbreviations used in this study are listed in the Glossary.

1.8 Outline of the Thesis

An introduction to the thesis, background to the research problem, research hypotheses and limitations of the study have already been presented. In the remainder of the thesis the following topics will be discussed. In Chapter Two the relevant literature is reviewed. The research design and method are discussed in Chapter Three. Chapter Four contains the results for the study. In Chapter Five the conclusions and recommendations for the study are presented.

CHAPTER TWO

LITERATURE REVIEW

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Nursing researchers have been concerned with the academic performance of students in undergraduate nursing courses. Much research has concentrated on the academic entry qualifications of students, particularly Tertiary Entrance Rank (TER) score and science subjects studied at school, and its relationship to nursing students' academic performance. To a much lesser extent, particularly in Australia, non-academic factors influencing a student's academic performance have been examined.

This chapter begins with a review of the Australian and American nursing literature pertaining to academic and non-academic factors that influence a student's academic performance in undergraduate nursing courses.

Then, the identified non-academic factors that are seen as influencing academic success in an undergraduate nursing course are discussed. These factors include: science, self-efficacy, vocational choice including women's career choices, demographic issues and the socio-economic background of students.

2.2 Academic Entry Qualifications and Academic Performance.

2.2.1 Introduction

In this section, Australian and American literature regarding students' academic entry qualifications and academic performance in undergraduate nursing courses are reviewed. This section concludes with an examination of the basis for selection to undergraduate nursing courses.

2.2.2 Australian Literature

Australian nursing students have been perceived as having difficulties with science subjects at tertiary institutions (Bishop, 1990; Caon & Treagust, 1992; Kershaw, 1989). Consequently Australian researchers have examined students' entry qualifications particularly science (namely biology) subjects, and subsequent success in the first year of a nursing course (Bishop,1990; Kershaw, 1989; 1990).

Nursing students are more likely to have studied biology at HSC level than any other science subject (Bishop, 1990; Burgum et al, 1993; Caon & Treagust, 1992; Kershaw, 1990). Few students are likely to have studied HSC Chemistry or HSC Physics (Kershaw, 1990; Bishop, 1990; Burgum et al, 1993). Moreover, many students have failed or performed poorly in these science subjects (Bishop, 1990; Caon & Treagust, 1992). Yet, in addition to nursing subjects in their first year, students will also be expected to be academically successful in subjects such as science, possibly chemistry and physics, research methods, psychology and sociology.

The study by Bishop (1990) examined the science background of students and their performance in science subjects in the first year of a NSW tertiary nursing diploma course. Data from six cohorts from 1985-1990 were analysed. Students were also categorised according to the time lapse between completing high school and commencing tertiary studies. Of the students enrolled in 1989, 20% failed more than one science subject in their mid- year examinations. A further analysis of the students who failed, demonstrated that 60% had science and mathematics at HSC level. The study was criticised for not determining whether students passed or failed their HSC science subjects (Caon & Treagust, 1992). However, mention is made of the modest achievement of students in HSC science.

Students of a first year Victorian College-based nursing course were the basis of a study by Kershaw (1989; 1990). The study focused on the efficacy of the Victorian Certificate or Education Anderson score (VCE Anderson score, is similar to NSW TER score) in the selection of nurses into higher education courses. The relationship between HSC Biology and English and first year academic performance was also examined.

After calculating the mean Anderson score for the 1988 cohort, students were then divided into those above or below the mean. It was found that HSC Biology was significantly correlated with the upper half of the group only for the first year subject Bioscience 1. However, HSC Biology did not correlate with either group for Physical Science 1 (Kershaw, 1989; 1990).

Whilst the subjects Bioscience 1 and Physical Science are not defined, it can be presumed that Bioscience 1 was a biology-type subject and Physical Science 1 a chemistry and possibly physics-type subject. Thus, it can be suggested that for the higher achieving students HSC Biology correlated with success in a biology-type subject. However, for either group, there was no correlation between HSC Biology and success in a chemistry/physics-type subject. Therefore, Kershaw (1989) felt that HSC Biology was not a particularly useful subject in the selection of students particularly for those in the lower half of a group .

The study by Caon and Treagust (1992) was also interested in biology and its relationship to success in the first year of a South Australian undergraduate nursing course. Four cohorts from 1989-1991 were examined. For each cohort, those students who had studied Publicly Examined Biology (PES Biology, is similar to the NSW, HSC Biology) were identified. Then, 27 of the most and 27 of the least successful students in the first semester of their course were selected from each cohort. Results demonstrated that students who obtained higher marks in the first semester nursing science subjects were found to also have higher scores in PES Biology.

Unfortunately, a significant group of students who were successful in their first semester science course were not included in this study (Caon & Treagust, 1992), because they had not studied PES Biology. The group excluded was suggested by the researcher as probably being mature age students. Hence they conclude their study by suggesting that with the exclusion of mature age students (that is 43% of students), PES Biology could be useful in the prediction of success in an undergraduate nursing course. In contrast, and with similar results, Kershaw (1989) concludes that HSC Biology was not a useful predictor of success.

2.2.3 American Literature

Much of the overseas research pertaining to tertiary nursing education has been documented by American researchers. Tertiary education for American nurses has been available for many years. Whilst there are differences to Australian tertiary nursing education, much information can be gained from their research experiences.

American baccalaureate nursing education is conducted at tertiary institutions which are accredited by the National League for Nursing (Dell & Valine, 1990). A baccalaureate nursing course is generally four years. There is a fundamental difference between Australian and American nursing education as, even after successfully completing a degree course, a student must pass the National Council for Licensing Examination for Registered Nurses (NCLEX-RN) before being eligible for nurse registration. Many aspects of tertiary nursing eduction have been investigated in an effort to identify accurate and reliable predictors of NCLEX-RN performance.

A student's pre-admission variables have been examined in relation to NCLEX-RN performance. The term "pre-admission" is used to refer to student's entry characteristics. A student's entry Grade Point Average (GPA) alone has been found to account for 58% (Dell & Valine, 1990) of the variance in the NCLEX-RN.

Another pre-admission variable analysed has been the score obtained on one American national standardized test called the Scholastic Aptitude Test (SAT). The SAT verbal scores were found to be a strong predictor when related to university theory grades (Wold & Wirth, 1990). They have also been identified as early predictors of NCLEX-RN performance (Waterhouse, Caroll & Beeman, 1993). These researchers suggest that students with low scores should receive help to improve their written skills.

A student's pre-admission subjects have been examined to identify their relationship with NCLEX-RN performance. The subject, social science, was consistently found to be a better predictor than natural science, mathematics or English (Fowles, 1992; Mills et al, 1992).

The most widely documented predictors of NCLEX-RN performance have been a student's nursing course grades and/or GPA (Dell & Valine, 1990; Horns, O'Sullivan & Goodman, 1991; Mills et al, 1992). Many of these studies also include pre-admission variables.

After examining entry and course GPA, the end of junior (third) year was identified by many researchers as the best time for predicting NCLEX-RN performance (Fowles, 1992; Jenks, Selekman, Bross & Paquet, 1989; Waterhouse et al, 1993; Whitley & Chadwick, 1986; Wold & Wirth, 1990) .

Whitley and Chadwick (1986) noted that students with low cumulative and science GPA on entry to a nursing course, who also obtained scores below the mean on tertiary examinations, were at risk for failing the NCLEX-RN. They (Whitley & Chadwick, 1986) suggest that a tertiary nursing course appears to prepare the above average learner for the NCLEX-RN, but was inadequate in preparing the average or below average learner. Similarly, other researchers (Mills et al, 1992) found that students who maintained a grade average of C or C+ during their nursing course decreased their probability of success on the NCLEX-RN as they progressed through their course.

2.2.4 Summary

Both Australian and American researchers have demonstrated a concern for the relationship between the academic entry qualifications of nursing students and their subsequent academic performance.

American students must be successful in an external registration examination to become a Registered Nurse. Nursing researchers have used this examination for comparisons with academic entry qualifications and academic performance. They have also identified the critical time for prediction of academic success and for possible intervention.

Australian researchers have concentrated on subjects (particularly science) in an undergraduate nursing curriculum, especially those studied in the first year. They have found that biology, the science subject most likely to be studied by nursing students at high school, was not a reliable predictor of academic performance in first year science subjects.

2.2.5 Selection of Students

Places in NSW university nursing courses are primarily awarded competitively on the basis of a student's TER score. This score is an indication of a student's performance in examinations held in the final years of their secondary education. The TER is reported as a score out of 100, with higher and lower scores indicating a better or poorer academic performance respectively .

Universities set cut-off TER scores for courses offered by the institution. The cut-off TER scores are the minimum scores a university will accept for students entering a course. However, cut-off scores can be misleading because, if a course quota is not filled, the cut-off TER score may be lowered until all places are taken.

Females entering undergraduate nursing courses are most likely to come from the third and lowest quartile of TER scores with only 3.1% having TER scores in the highest quartile (DEET, 1990).

2.3 Non-Academic Factors and Academic Performance

2.3.1 Introduction

This section includes a review of Australian and American research findings pertaining to the non-academic factors that influence undergraduate nursing students' academic performance. The section concludes with a summary.

2.3.2 Australian Literature

Some Australian studies have examined non-academic factors and their relationship to academic success in an undergraduate nursing course. Bishop (1990), for example, collected information on students' hours of employment, family responsibility, previous occupation and whether nursing was their first choice, for her investigation of academic qualification and performance in science courses. Whilst the details of the analysis of these non-academic factors are not documented in her research paper, she does state that "motivation is probably an important factor since students for whom nursing was a first choice tended to perform better" (Bishop, 1990, p61).

One study (Higgins & Leelarthaepin, 1986) examined the relationship between selected academic and non-academic variables, identified in a standardized interview used for selecting mature-age candidates to a college nursing program. The interview sought to determine a candidate's academic skills, motivation and commitment to the program. Candidates were assigned a score, ranked and selected for nursing according to their interview performance as measured by standardized interview criteria. Examination results for the first year were used to determine the correlation between a student's rank and academic performance. With 65% of the variance accounted for by the interview/ranking procedure, the researchers conclude that the procedure appeared to assess the student capabilities it was designed to measure. Yet some overseas studies, for example Jenks et al (1989), have established comparable results simply by correlating a student's academic background on admission with academic success in a tertiary nursing course.

The researchers (Higgins & Leelarthaepin, 1986) came to a conclusion similar to Caon and Treagust (1992) by suggesting that prediction may be an unattainable goal in relation to academic performance at the tertiary level.

The effects of selected variables on academic performance and persistence in the first year of a Diploma of Nursing course were analysed by Burgum et al (1993). An adapted version of a descriptive model of dropout from tertiary nursing schools in America was used for the study. Academic and non-academic variables were examined. These variables addressed areas such as: a student's demographic/personal/family background, academic performance in HSC/tertiary studies, work experiences, attitudes, plans and aspirations.

The researchers (Burgum et al, 1993) found that TER scores were the best predictors of tertiary academic performance. A lower socio-economic background and course completion for self development rather than for a professional qualification were more weakly related to tertiary academic performance (Burgum et al, 1993). Persistence in the first year of a tertiary nursing course was related to realistic educational aspirations, that is, "the aspiration to complete a baccalaureate rather than a higher degree in nursing" (Burgum et al, 1993, p157). Other, weaker predictors of persistence (at 10% level) were: student's socio-economic background, type of school attended, helpfulness of mother, comfort from/finding academic staff easy to approach, Australian birth, English "not as a first language" and other than nursing work experience (Burgum et al, 1993, p163).

Undergraduate nursing students have been found to have a low opinion of their science ability. In a study by Caon and Treagust (1993), first year nursing students were divided into three groups on the basis of their first semester academic results for a science subject. The groups were labelled as "successful", "unsuccessful" and "middle" (Caon & Treagust, 1993, p255). Data on students' study habits were collected by questionnaire prior to the final science examination for the first year. These data measured students' perceptions of science including: difficulty of the subject, effort required and relevance of science to nursing. In addition, students were asked to predict the science grade they would be awarded. For the "unsuccessful" group only two students predicted a fail grade whilst in fact twenty students failed. Students in the "successful" group were more accurate predictors than those in the "unsuccessful" group. An explanation might be that "People generally overestimate the adequacy of their knowledge, especially in areas of limited familiarity" (Bandura, 1986, p223). In other words, these results might indicate that students had inadequate feedback on which they could gauge their academic performance, during the semester.

Students in the "unsuccessful" group were also found to have a low opinion of their science ability, to perceive science as difficult and not relevant to nursing. All groups put more effort into their study of science than other areas of the course (Caon & Treagust, 1993).

Self-efficacy has also been investigated (Cooper, Bicknell & Leigh, 1992; Harvey & Mc Murray, 1994) and this literature is discussed in the section "self-efficacy and nursing".

2.3.3 American Literature

Researchers have studied a wide variety of non-academic factors, in addition to academic pre-admission variables, when examining academic performance of nursing students.

One preadmission variable, age, has been shown to be inversely related to academic performance. That is, for each decade above the age of twenty there was a decrease in performance on the NCLEX-RN (Mills et al, 1992). Another study, however, found that age was not related to NCLEX-RN scores but GPA and race were (Horns et al, 1991).

Attitudes to race/racism as measured by the variable "understanding racism" was the only one, of eight non-cognitive variables investigated, that correlated with nursing GPA in another study (Kornguth, Frisch, Shovein & Williams, 1994). Mention must be made of the fact that American nursing students come from varied ethnic backgrounds whilst Australian students are predominantly "Anglo-Australian" (Neill & Barclay, 1989).

Attributes thought to be necessary for the successful use of the nursing process in a nursing course have been investigated (Wold & Wirth, 1990). These attributes included: verbal knowledge, convergent thinking and field independent perceptual style (Wold & Wirth, 1990). Verbal knowledge as measured by SAT was correlated to academic GPA. Once again, however, the best predictor of GPA was the prerequisite subjects required for entry into the course (including science and English).

A student's anxieties, physical responses and ability to concentrate when sitting for tests/examinations have also been investigated (Poorman & Martin, 1991). Two other non-academic variables used in this study were: students' self-prediction of academic grades and NCLEX-RN score. Whilst a student's anxieties were inversely related to NCLEX-RN score for some students, for others, anxieties were not a disadvantage. What the researchers (Poorman & Martin, 1991) did find, is that students were the best predictors of academic performance (grades and NCLEX score).

Dyer (1987) also found that students were accurate predictors of academic performance. She was interested in predicting university success and first-year job performance. To do this, a biographical inventory was developed and tested on college students over a seven-year period. In addition, students completed the Strong Campbell Interest Inventory and California Psychological Inventory which were found to account for 6% and 7%, respectively, of variance in nursing GPA. However, the best predictors of nursing and university GPA were found to be items on the biographical inventory relating to students' self-perceptions of academic achievement at high school, for example, perceived success in physical science and feelings of current achievement. Interestingly, "concern for others" was negatively correlated to GPA. In other words, students achieved good grades if they "concentrated on learning subject matter and did not become concerned with others" (Dyer, 1987, p668).

Similarly, other researchers have found that students who learn by "problem-solving with their peers" are not as successful as those who use other cognitive learning styles (Nortridge, Mayeux, Anderson & Bell, 1992). These researchers investigated first year undergraduate nursing student's cognitive style of learning in relation to academic success. Cognitive style was described as the way an individual cognitively processes and uses information obtained from the environment by using a modified educational tool. It was found that three styles, preference for finding meaning from the written word, independent problem-solving and a logical deductive approach in decision making, were positively correlated to academic success. However, the cognitive styles of preference for finding meaning from sight, for problem-solving with peers and for categorical reasoning were negatively correlated with academic success.

2.3.4 Summary

Demonstrating that non-academic variables are stronger predictors of academic performance than entry qualifications has had mixed success. The fact that studies have shown TER (Burgum et al, 1993) or prerequisite subjects (Wold & Wirth, 1990) are the best predictors may, in fact, indicate the weakness of the non-academic variables investigated.

Whilst researchers in America (Dyer, 1987; Poorman & Martin, 1991) have found that students are the best predictors of their academic performance, researchers in Australia (Caon & Treagust, 1993) have found this only applied to the more academically successful students.

Having reviewed selected literature relating to academic and non-academic factors pertaining to nursing students' academic performance, the literature relating to specific areas (namely science, gender characteristics self-efficacy, vocational choice, demographics and social characteristics of nursing students) will now be reviewed.

2.4 Science and Nursing Education

2.4.1 Introduction

An area of great concern for Australian researchers has been the relationship between a nursing students' high school science background and academic performance in undergraduate science subjects in a nursing course. Therefore, in this section, some background gender issues relating to science and education are introduced. The science/mathematics background of nursing students and their attitudes to science are then discussed.

2.4.2 Gender and Education

Although Australian females perform as well as males in science at high school (Burfitt, 1989; Stewart, 1991) many opt out of these subjects before the HSC (DEET, 1991; Stewart, 1991). More females than males actually participate in science subjects until year 12 when a reverse in the situation occurs (DEET, 1991). Moreover, the following discussions indicate that neither increasing the flexibility of students' subject choice at high school, nor decreasing it, has the effect of encouraging females to study science at HSC level.

In 1988, in Western Australia, for example, a new high school curriculum was introduced which gave students aged 13-15 years a greater flexibility of subject choice. Whilst this resulted in both sexes choosing fewer science subjects at high school, a trend in early sex-stereotyping of science subjects also became evident. More females preferred biological science subjects to physical sciences (physics, chemistry). Thus a greater flexibility in subject choice resulted in females curtailing their career options by the age of 15 years (Rennie & Parker, 1993).

On the other hand, in the UK, a national curriculum was introduced in 1988 making science compulsory for all children up to the age of 16 years. Prior to 1988, more boys than girls studied science subjects at high school. Whilst after 1988 the academic achievement of both sexes was found to be similar, the reduced flexibility of subject choice had only a limited effect in increasing the number of females choosing science at A level (similar to NSW HSC) (Stewart, 1994).

The crucial question, then, is why do females avoid science? The answer to this question can be summarised as an interaction between educational, personal and socialisation factors that translate into attitudes to science (Lakes, 1985). The educational factors include: the image that science is unrelated to everyday life (Kelly, 1982), teacher encouragement for science, and the relationship between mathematics and science (Lakes, 1985). The personal factors refer to a student's cognitive abilities. Socialisation includes the sex-stereotyping of subjects, sex-role identity and the influence of family and role-models. These issues are discussed with reference to nursing education in the following sub-sections/sections.

2.4.3 Science Background of Nursing Students

The science background of nursing students is summarized in Table 2.1. The nursing data were obtained from published articles/papers that used samples of 1989 first year undergraduate nursing students from the states listed. These articles/papers are referenced under the heading termed "Source" immediately below the Table. From this table, it can been seen that biology is the science subject more nursing students are likely to have studied at HSC level. Few students have studied chemistry or physics at HSC level.

The science background of nursing students in 1989 is compared with the 1988 state averages for female participation in year 12 biology, chemistry and physics. The year 1988 is used for comparison as this is the year when many of these students would have participated in year 12 studies. Table 2.1 also demonstrates that nursing students are well below the state average for participation in physics and chemistry subjects. The participation rates for biology are below the state averages for Vic and SA and slightly above for NSW.

Table 2.1

Comparison of the 1989 Science Background of Vic, SA and NSW Nursing Students with 1988 State Averages for Females

State	Biology % Sat (Failed)	Chemistry % Sat (Failed)	Physics % Sat (Failed)
Vic(1)	64 (22)	11 (21)	2 (33)
State Average(2)	70.1	45.1	26
NSW(3)	68 (na)	13 (na)	13 (na)
State Average	64.9	44.1	26.4
SA(4)	52 (67)	na (na)	na (na)
State Average	69.8	35.7	28.3

Source:

(1) Kershaw, 1990.

(2) DEET, 1991 State participation rates for females adapted from National Data Base on the Education of Girls in Schools.

(3) Bishop, 1990, 'category A' students in her study.

(4) Caon & Treagust, 1992.

In a more recent study, it was found that 65% of nursing students had studied biology at year 12. Moreover, 68% and 80% of nursing students had studied chemistry and physics respectively only to year 10 level or below (Koerner & Thalluri, 1992).

2.4.4 Sex-Stereotyping of Subjects

Lumb and Strube (1993) found when comparing key words found in literature, to describe nurse/nursing of science/scientist, that there was no commonality between them. Words used to describe nurses/nursing, for example, included "feminine, mother-like, cuddly, lacking knowledge" whereas science/scientist was described in masculine terms of "lab, coat, cold, and knowledgeable" (Lumb & Strube, 1993, p90).

Many subjects are gender stereotyped, with science (particularly chemistry and physics) having a masculine image (Archer & Freedman, 1989; Thomas, 1990). Associated with this image is the view that masculine subjects are difficult whilst feminine ones by comparison are easy (Archer & Freedman, 1989).

It may be possible, therefore, to describe an undergraduate nursing course as containing feminine subjects (for example nursing practice) and masculine (science) subjects. It has also been demonstrated that nursing students find the science areas of the curriculum difficult (Caon & Treagust, 1993). First year nursing students have also been found to spend more time studying science than nursing practice even though the nursing practice units had more contact hours (Cooper, Bicknell & Leigh, 1992).

2.4.5 Single-Sex/Co-Educational Schooling

Evidence about single-sex versus co-educational schooling and academic performance and participation in science is mixed.

Girls from single-sex schools are more likely to have studied science (Carpenter & Western, 1989). They have less stereotyped attitudes of school subjects than girls from co-educational schools (Lawrie & Brown, 1992). Girls in government schools were found to support single-sex classes for science (Jones, 1994).

A study incorporating the school background of recently graduated scientists found that they were equally likely to attend single sex or co-educational schools (Hegarty-Hazel, 1990). However, Carpenter and Western (1989) found that girls from co-educational schools are more likely to get better science scores in year 12 than those from single-sex schools.

2.4.6 Summary

Australian nursing students have been found to have difficulties with the science subjects in undergraduate nursing programs (Bishop, 1990; Caon & Treagust, 1992; Kershaw, 1989). Initially researchers looked at high school subjects studied by the students. The subject of most research interest has been biology as it is the one more students are likely to have studied at school. Only a weak relationship was found between biology results and academic performance in first year science subjects of undergraduate nursing courses. This stimulated researchers to examine other issues in attempt to understand nursing students' anxieties about science.

Researchers have increasingly turned their attention to "attitudes" as an explanation (Caon & Mayne, 1992; Caon & Teagust, 1993; Cooper, Bicknell & Leigh, 1992; Lumbe & Strube, 1993; Neil, 1992). Some (Caon & Mayne, 1992; Gillies & Soars, 1992; Koerner & Thalluri, 1992) have tried to change students' attitudes to science. In one such attempt, a program was conducted to develop the mathematics and science skills of mature-age students prior to the commencement of a nursing course (Gillies & Soars, 1992). The results indicated that the greatest improvement occurred in students with a stronger entry performance. However, little change occurred in those students with a poor entry performance. In other words, the program failed to have an impact on those most in need of the program.

Others (Caon & Treagust, 1992) have had similar set-backs. A tool developed for high school students called the Test of Science Related Attitudes (TOSRA) was given to first year nursing students before and after an introductory bioscience subject. Contrary to researcher expectations, the subject was found to have a negative impact on students' attitudes to science.

Nursing students are predominantly female and are likely to have a participation rate below the state average for science subjects (biology, physics and chemistry) (see Table 2.1). It is therefore suggested that students' anxieties about science are present well before they commence an undergraduate nursing course. Many researchers have failed to document any connection between gender, attitudes to science and academic performance. Although Caon and Treagust (1993, p256) allude to socialisation influences when suggesting that " It is reasonable to suspect that some of the unique characteristics of nursing students will have an impact on the level of success that they have in coping with their science background." Lumb and Strube (1993, p90) however, discuss gender socialisation and suggest curriculum time be given to exploring students' "images, attitudes and feelings about science."

Another area that has been neglected in the investigation of science attitudes is the influence of role models in academic behaviour. In a British study, it was discovered that only 15.3% of lecturers teaching undergraduate science subjects in an undergraduate nursing course had a nursing qualification (Wharad, Allcock & Chapple, 1994, p439). It is not known to what extent this figure applies to Australian tertiary courses.

The concentration of research on science subjects can be criticised for appearing to value this area more highly than other nursing subjects in a nursing course, especially as a survey of NSW tertiary institutions showed that the science component of a nursing course was approximately 10-17% (Neyle, 1992). The figure may distort the fact, however, that much of the science is taught in the first year of a nursing course.

To fully appreciate nursing students' attitudes to science and nursing, we need to also examine issues related to females' vocational choices and their self-efficacy expectations for academic success.

2.5 Gender Characteristics

2.5.1 Introduction

Socialisation through sex-role identity has been suggested as a reason for females' avoidance of science. In this section, sex-role identity is discussed and then related to nursing education.

2.5.2 Sex-Role Identity

Sex-role psychological characteristics have been studied as a list of traits thought to reflect masculinity and femininity. Masculine traits include "competitiveness", "independence" and "aggression" (Spence, Helmreich & Stapp, 1975). These traits are alternatively termed "instrumental" referring to a cognitive focus on "getting the job done" (Bem, 1974, p156). Feminine traits include "kind", "emotional" and "excitable" (Spence et al, 1975). Alternatively, they are referred to as the "expressive" traits implying "an affective concern for the welfare of others" (Bem, 1974, p156).

Before the 1970s, masculinity and femininity were considered opposite ends on a bipolar line. This implied that a greater degree of femininity inferred a lesser degree of masculinity or vice versa (Betz & Fitzgerald, 1987; Oskam, 1991; Spence et al, 1975).

In the 1970s, researchers (Bem, 1974; Spence et al, 1975) suggested that it was possible to measure masculine and feminine characteristics as two independent dimensions thereby implying that it was possible for a person to score high or low on both dimensions.

The term "androgyny" was introduced to describe a balance of masculine and feminine characteristics in an individual (Bem, 1974). It was hypothesised that because of this balance these individuals would have wider behavioural and coping abilities (Bem, 1974; 1977; 1979; 1981).

Bem (1974) devised the Bem Sex-Role Inventory (BSRI) to measure masculine and feminine characteristics. She initially compiled 200 masculine and feminine characteristics and 200 neutral items. Undergraduate students were asked to judge the items according to whether they were considered appropriate for males, or females in American society. Items were rated from 1 (not at all desirable) to 7 (extremely desirable) for each gender. From these items came the final BSRI which contained 60 items, 20 each of masculine, feminine and neutral characteristics. Later the BSRI was revised, reduced to 30 items and called the BSRI short version (Bem, 1979).

Masculine and feminine characteristics were found to co-exist in both sexes, although, usually they were present in varying degrees. In addition to obtaining Masculinity and Femininity scores from the BSRI, individuals could be considered sex-typed if their gender and the appropriate characteristics corresponded (Spence et al, 1975; Bem, 1977).

Bem (1981) proposed a "gender-schema" theory to explain how sex-typing occurs. She discusses, how from early childhood, an individual is constantly exposed to the presentation of information in a sex-linked manner. In this theory, it was proposed, that as a result of the cognitive processing of the sex-linked information, an individual builds a schema of gender-appropriate behaviour. All subsequent information would be judged according to the person's gender-schema. A strong gender-schema was thought to result in sex-typing of an individual. Gender schemas are considered important by enabling individuals to process information "swiftly and economically" (Sears, Peplau, Freedman & Taylor, 1988, p101).

Whilst Bem's gender-schema theory accounts for the socialisation effects on gender in childhood, it fails to explain why sex-typing becomes more noticeable at certain stages in an individual's life, particularly during adolescence. A meta-analysis of research studies of masculinity, femininity and androgyny concluded that the sex-role pressures of adolescence accentuate what are only small differences between the sexes (Signorella & Jamison, 1986). This fact was also noted in research involving case studies of four Australian high schools, where the researchers observed that "the construction of masculinity and femininity takes place daily at school" (Kenway & Willis, 1993, p71)

This theory (Bem, 1981) can be used to understand females' avoidance of science. If science is constantly portrayed as "masculine", persons with a strong feminine gender-schema would not readily identify with science. Involvement in science would be perceived as compromising their gender-schema.

Researchers have shown that females' Masculinity scores are related to self-efficacy expectations for mathematics (Betz & Hackett, 1983), career motivation (Farmer, 1985), and career choice (Fassinger, 1985; O'Brien & Fassinger, 1993). However, females' Femininity scores were not related significantly to mathematics self-efficacy expectations (Betz & Hackett, 1983) or career motivation (Farmer, 1985).

2.5.3 Sex-Role Identity and Nursing Education

Nursing students have been shown to have significantly more feminine characteristics than much of the general student population (Bough, 1988; 1992; Till, 1980; Vandever, 1978).

Nursing students in undergraduate courses have also been found to have less masculine characteristics than students from arts, science, business and education (Bough, 1988). However, no significant difference was found between the mean Masculinity score for nursing students and students from other faculties prior to graduation (Bough, 1992). This supports earlier research (Till, 1980), which found that undergraduate nursing courses had a positive effect on the encouragement of masculine traits in nursing students. It was also found that nursing students have less feminine characteristics, as measured by the BSRI, as they progress through their course. Possession of more masculine characteristics may thus be related to academic success in an undergraduate nursing course. Certainly, it has been shown that nursing students with more masculine characteristics have higher expectations for success when learning research methods, a topic which has a masculine image (Barron, 1987).

2.6 Self-Efficacy (Motivation)

2.6.1 Introduction

In this section, Bandura's (1977, 1986) theory of self-efficacy is introduced. The main sources of self-efficacy information are outlined with reference to nursing education. These are: performance attainments, vicarious experience, verbal persuasion and physiological state. Studies involving self-efficacy and academic performance in nursing education are also discussed in this section. Also included in this section is self-efficacy and academic performance and persistence. Self-efficacy and vocational choice is discussed in section 2.7.3

2.6.2 Introduction to Self-Efficacy Theory

Self-efficacy is a belief or expectation about one's ability to successfully perform a task or behaviour (Bandura 1977; 1986). The concept, which has its origins in social learning theory, was identified in the late 1970s by a psychologist, Albert Bandura. As his theory subsequently diverged from social learning theory, the term social cognitive theory was employed to describe this development (Bandura, 1986).

In the social cognitive theory, an individual's behaviour is determined through continual reciprocal interactions between cognitive, behavioural and environmental factors (Bandura, 1986). Through this reciprocal process, cognitive factors called forethought, are seen to determine actions and behaviours which are in turn shaped by environmental and social factors (Bandura, 1986). The feedback provided to individuals from environmental and social factors then influences a person's cognitive appraisal of the outcome. This cognitive self-reflective capability enables an individual to evaluate, and alter their own thinking to decide on future behaviour (Bandura, 1988).

Human learning and motivation from the social cognitive perspective are therefore seen in terms of cognitive processes that develop through direct or observed experiences (Bandura, 1977). The cognitive process involves the setting of internal standards or goals and the evaluation of one's own performances.

Individuals are considered to create self-inducements to persist at a task or behaviour until their performance matches their self-prescribed standards. Through feedback, information is conveyed about: the aspects of a performance that need to be improved, signs of progress and the goals an individual will set for future performances.

Self-efficacy is a judgement one makes about one's capabilities to perform a task or behaviour. This judgement, which is a significant determinant of behavioural performance, may be independent of the actual skills one possesses (Bandura, 1988).

Self-efficacy is primarily concerned, therefore, with the influence of self-referent thought on an individual's psychosocial functioning. Self-efficacy is characterized by two types of expectations: *efficacy expectations* which are the beliefs in one's ability to achieve a specific standard of performance and *outcome expectations* which are the beliefs that a given behaviour will result in a particular outcome (Bandura, 1977; 1986). This distinction between the two types of expectations can assist in the understanding of how judgements about self-efficacy are made. For example, students may believe that long hours of study will result in high academic grades in a nursing course, but may have self doubts regarding their own ability to understand the science components of the course (Bandura, 1986) .

Judgements of self-efficacy therefore determine one's efforts and persistence in the face of obstacles. The stronger one's self-efficacy is, the more rigorous and persistent one's efforts to succeed are likely to be (Bandura, 1977; 1986). A person's perceived self-efficacy may be influenced by emotional reactions to one's anticipation of the outcome, causing stress and diverting attention from judgements on how best to proceed (Bandura, 1977; 1986).

Self-efficacy varies according to the level, generality and strength of one's judgement of efficacy expectations. *Level* refers to the task difficulty one feels capable of attempting. *Generality* refers to the generalisability or transference of expectations to other behavioural domains. *Strength* is the durability of belief in one's capabilities in the face of adversity or challenge (Bandura, 1986; Hackett & Betz, 1981). Self-efficacy information is considered to be obtained from four main sources: performance attainments, vicarious experience, verbal persuasion and physiological state (Bandura, 1977; 1986).

2.6.3 Performance Attainments

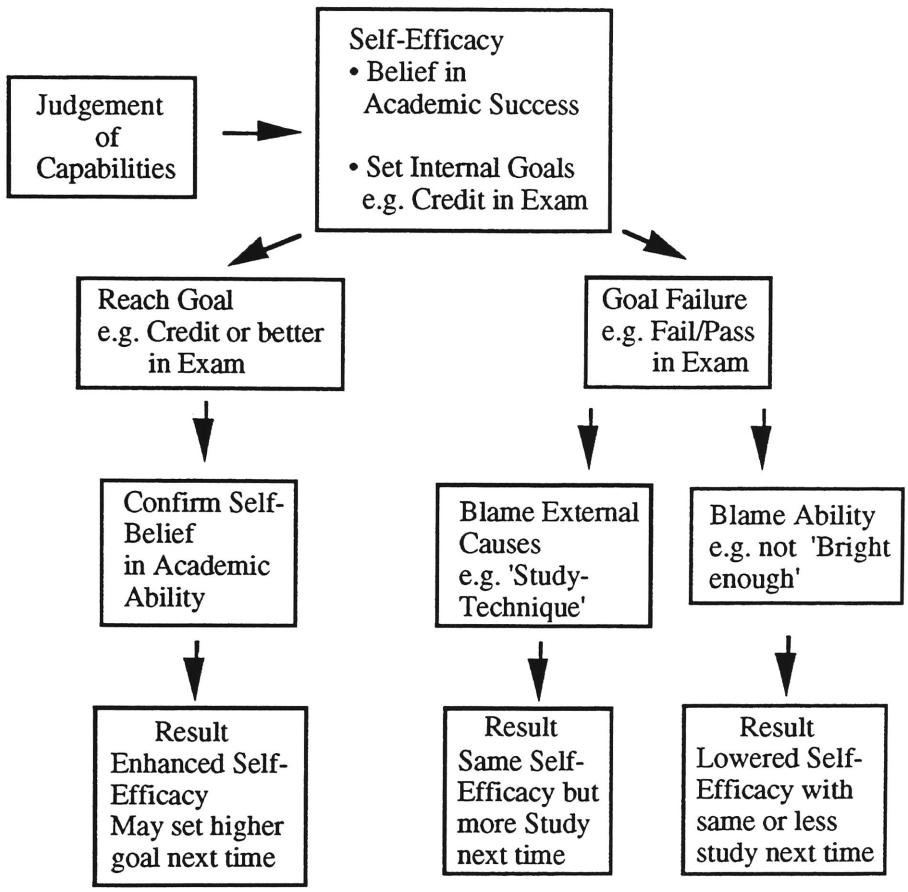
Performance attainments later renamed "enactive attainment" (Bandura, 1986, p399) are sources of efficacy information based on a person's actual experiences. It is therefore considered to be the most influential of the sources of efficacy information (Bandura, 1977). To a student, academic experiences are a source of efficacy information, with their personal experiences serving to raise or lower expectations of competence and confidence in their academic performance. A student who has been highly academically successful will have high self-efficacy expectations in relation to future academic pursuits. Alternatively, a student who has had poor academic success may have low self-efficacy expectations for future success.

According to Bandura's theory (1977; 1986), when a student with strong self-efficacy expectations experiences a failure in either an exam, assignment or subject, they are likely to attribute it to external factors such as insufficient effort/study or poor learning strategies. Greater effort is employed to overcome the obstacle and succeed in future academic pursuits. However, a student with low self-efficacy expectations will attribute failure to internal factors such as lack of intellectual ability, which will result in a further lowering of self-efficacy expectations for future academic success (see Figure 2.1).

Before the HSC or mature-age entry became mandatory for admission to a nursing course, students' entry qualifications were diverse (Mackay et al, 1981; Quine, 1977). It was shown that students with a higher level of secondary education, for example students with the HSC, were more likely to be successful in the nursing registration examinations (Quine, 1977). Using Bandura's (1977; 1986) self-efficacy theory, it could be stated that students with a higher level of secondary education had more academic mastery experiences and therefore probably had a higher level of self-efficacy in relation to the nurses' registration examination.

Figure 2.1

Motivational Effect of Self-Efficacy on Academic Achievement



It was also noted that for students who failed in their first attempt at the Nurses' Registration Examination the percentage of them passing was lower for each subsequent attempt (Quine, 1977). Bandura (1986) states that repeated failures lower self-efficacy expectations and it would appear that this probably applied to this group.

A student's academic experiences are a source of efficacy information, with their personal experiences serving to raise or lower self efficacy-expectations. A student who has been highly successful academically will have high self-efficacy in relation to future academic pursuits. Alternatively, a student who has had poor academic success may have low self-efficacy for further academic performance.

For a student entering an undergraduate nursing course, previous high school experiences of subjects studied, grades obtained and TER score will serve as sources of academic self- efficacy information.

2.6.4 Verbal Persuasion

Verbal suggestions of others can influence self-efficacy by persuading people that they have the capabilities to succeed. The influence of verbal persuasion is enhanced if it is considered to be a realistic appraisal of a person's capability to succeed (Bandura, 1986).

An experimental group of full-time college students aged 18-21 years were exposed to a once-only 10 minute persuasive talk about nursing as a career (Strader & Katz, 1990). Within one month of the talk, 17% of the group chose to forward application forms to a nursing department. The control group did not receive this persuasive talk about nursing. Subsequently none of the control group, within one month of their talk, chose to pursue nursing as a career. A week prior to the talks, the beliefs, attitudes and intentions about nursing as a career were ascertained for both groups. The experimental group showed a significantly more positive change in beliefs and attitudes toward nursing as a career than the control group (Strader & Katz, 1990). To be effective, verbal persuasion must be accompanied by the provision of tools necessary to achieve success (Bandura, 1986). In this study, students were given request forms to sign up for a nursing program and thus complete the application process (Strader & Katz, 1990).

2.6.5 Vicarious Experience

Vicarious experience refers to the observation of people's behaviour and its subsequent influence on self-efficacy expectations.

In the social cognitive theory, it is recognised that people learn by observing the behaviour of others and, by the cognitive visualisation of behaviour as portrayed by words (for example, books or newspapers) and images (for example, television). This influence of modelling, however, is not viewed as imitation but rather as a psychological matching process. The observer cognitively processes the behaviour portrayed and evaluates it according to self-set standards. Observed behaviour is more likely to be exhibited if it will be rewarded and if it is self satisfying to the individual (Bandura, 1986).

Thus, self-efficacy expectations can be altered by the observation or cognitive visualisation of others successfully or unsuccessfully performing a task or behaviour. Vicarious information is important when an individual is confronted with a new situation with which one has minimal experience to rely on. In this situation, vicarious information will determine one's self-efficacy expectations for success or failure of the task or behaviour (Bandura, 1977; 1986).

The influence of role models and the realisation of their importance to nursing education has been well established (Davies, 1993; Kelly, 1992; Wilson, 1994). For example, in a recent Australian study (Davies, 1993) nursing students were interviewed during three successive clinical placements in their nursing course. The researchers were interested in establishing the changes in a student's knowledge of clinical practice reflected by their observations of clinical role models. Indeed, it was found that with each clinical placement, students built upon previous knowledge to reach, during their placement, a comprehensive view of clinical nursing.

By observing clinical role models, students were able to identify the personal attributes of nurses which they considered essential to their definition of a nurse. Thus, through clinical models, nursing students gain a broad view of the concept of clinical nursing. And, in accordance with the psychological matching process of social cognitive theory, students are cognitively processing and evaluating the information learnt vicariously.

Kelly (1992) also found that role models were influential to nursing students. By interviewing final year baccalaureate nursing students, caring role models were identified as a major influence during their course. When ranked, nursing faculty members and nursing clinical supervisors were identified as first and second respectively. Students were found to judge the qualities of the observed role models and then select those qualities they admired. These qualities were then incorporated and reflected in a student's own behaviour and thoughts. Hence, the modelling influence was again found to involve a psychological matching process (Bandura, 1986).

In addition to a positive influence, role models were also found to have a negative impact on student's self-confidence. Students who were given predominantly negative feedback were construed as internalising an "inferiority complex" (Kelly, 1992, p124). These findings from a self-efficacy viewpoint could be interpreted as demonstrating the influence of vicarious experience on self-efficacy expectations for nursing education.

2.6.6 Physiological State

A person's physiological state can influence judgements about their capabilities for success or failure in behavioural performance. Physiological information can include emotional states such as stress, anxiety, fear and moods or physical symptoms such as fatigue, aches and reduced stamina. The cognitive appraisal of these physiological states influences a person's actions and self-efficacy expectations (Bandura, 1977; 1986). Some forms of physiological arousal may be interpreted by an individual as beneficial whereas, to another, it may be interpreted as harmful and result in a lowering of self-efficacy expectations for success.

The relationship between university students' parental social support, anxiety, academic self-efficacy and GPA were investigated in three studies documented in one article (Cutrona, Cole, Colangelo, Assouline & Russell, 1994). In the third study, a highly significant relationship was found between students' admission scores obtained on the American College Testing Program (ACT) and academic self-efficacy. Self-efficacy was measured by the response to eight items, where students were asked to rate on a five-point scale their confidence in receiving a grade B or better for various university subjects. Academic self-efficacy was also significantly related to GPA. Parental support was correlated to students' anxiety but not to GPA. However, a component of parental support called "reassurance of worth" was a significant predictor of GPA in the first and second study. The researchers (Cutrona et al, 1994) interpreted this as suggesting that parents who recognise their offspring's capabilities may influence academic behaviour. The results (Cutrona et al, 1994, p375) for the third study showed that anxiety was only marginally ($p = 0.06$) correlated to academic self-efficacy. An explanation for this marginal relationship may be that interpersonal anxiety as measured by a tool incorporating aspects such as self-esteem, expressiveness, instrumentality, trust in others, beliefs about human nature and styles of loving, may not accurately reflect academic anxiety.

A second explanation could be Bandura's concept of the "co-effect" of anxiety on self-efficacy expectations (Bandura 1977; Hackett & Betz, 1981). That is, anxiety is induced when an individual has low self-efficacy expectations for academic success. The presence of anxiety then serves to further decrease academic self-efficacy expectations. An examination of the relationship between ACT and anxiety may have helped to establish this effect.

2.6.7 Self-Efficacy and Nurse Education

Self-efficacy theory has been applied to nursing education in Australia and America.

Australian researchers (Harvey & McMurray, 1994) developed two measures of nursing self-efficacy: a Nursing Academic Self-Efficacy Scale (NASES) and a Nursing Clinical Self-Efficacy Scale (NCSES). The development and testing of the measures involved three phases with different student samples. Each time the NASES and the NCSES were subjected to factor analysis resulting in them being redesigned. During phase two, the test-retest reliability for both measures demonstrated satisfactory internal consistency (NASES $r=0.67$, $p=<0.001$; NCSES $r=0.76$, $p=<0.001$; p475).

Phase three of the Australian study (Harvey & McMurray, 1994) involved a three-year longitudinal study of 306 first year nursing students from four tertiary institutions. During this phase, the NASES was found to consist of three factors with a total of twenty two items. Factor one included ten items pertaining to basic nursing constructs and could explain 47.6% of variance (p478). Factor two with six science-based items explained 12.6% variance and factor three with six microbiology/anatomy items 5.7% variance (p478). The NCSES was also found to contain three factors, with factor one (9 items) explaining 52.7%, factor two (8 items) 7.3% and factor three (9 items) 4.9% of variance respectively (p478).

Some of the findings from phase three of the Harvey and McMurray (1994) study included:

• students' previous nursing experience was significantly related to NCSES but not to NASES (p478),

• there was no significant difference for NASES and NCSES between students who choose nursing as a first choice and those for whom nursing was not a first choice (p480),

• there was no significant difference between males' and females' self-efficacy for both measures (p479),

• students who withdrew had a lower mean NASES and GPA than those who continued or completed their nursing course (p480-481).

The researchers (Harvey & McMurray, 1994) indicated that their study is continuing, and, that they intend to examine the relationship between academic self-efficacy beliefs and GPA, and clinical nursing self-efficacy and clinical performance.

An American study investigated the relationship between variables in a causal model of nursing academic achievement (Chacko & Huba, 1991). The instruments used in the study were: ASSET test to measure verbal and mathematical ability; Life Experiences Survey to measure an individual's life stress; and the Learning and Study Strategies Inventory (LASSI) to measure students' learning strategy and study skills. Finally, academic achievement was established by the collection of first year grades for an introductory nursing theory subject. Notably, 68% of the sample of 134 first year nursing students were mature age students (over 24 years). Self-efficacy was a sub-scale of the LASSI which was designed to measure students' perceptions of academic competence and worry/anxiety regarding academic performance. Importantly, the LASSI was not specifically designed for undergraduate nursing students.

The authors (Chacko & Huba, 1991) report that the LASSI, a self-report instrument developed by Weinstein, Schultz and Palmer, was validated by Chacko (1991) to be used with undergraduate nursing students.

Four variables were found to be directly related to self-efficacy: language ability, mathematical ability, motivation and concentration/preparation for class (Chacko & Huba, 1991). Further, life stress, motivation and use of study strategies correlated with concentration/preparation for class. Only verbal ability and self-efficacy were directly related to academic achievement. The model could explain 46% of the variance in academic achievement.

The fact that life stress was not related to self-efficacy leads the authors (Chacko & Huba, 1991) to conclude that the ability to react and cope with life stress may have been more appropriate to this group of largely mature age students. Alternatively, it can be suggested that life stress may be more appropriately reflected by persistence in a course than by academic difficulties.

The findings overall (Chacko & Huba, 1991) were interpreted as demonstrating the complexities involved in analysing academic achievement. Hence, superior academic achievement was summarised as an interrelationship between factors such as superior cognitive ability, decreased life stress, high motivation, positive self-efficacy and ability to concentrate/prepare for class.

The LASSI has been used to investigate the study skills of first year Australian nursing students (Cooper et al, 1992). Students' attitudes to science and their relevance to nursing and study patterns were studied. Results indicated that students found the science difficult and spent more time studying for bioscience and physical science than nursing practice subjects. The researchers concluded that students' study habits may be ineffective and suggest that a remedial program should be made available for nursing students.

2.6.8 Academic Performance and Persistence

Self-efficacy has been shown to be related to academic success and persistence, particularly for students considering science and engineering careers and enrolled in an educational/planning course (Lent, Brown & Larkin, 1984; 1986; 1987).

A major finding of the 1984 (Lent, Brown & Larkin) study was that the level and strength of self-efficacy for the educational requirements of science and engineering majors were related to academic outcome. That is, students with high levels of measured self-efficacy expectations generally achieved higher grades and persisted longer in the science/engineering field, than the students with low self-efficacy expectations. Self-efficacy scores were also moderately and significantly correlated to academic background as measured by Preliminary Scholastic Aptitude Test (PSAT) and high school ranks.

In a further study (Lent, Brown & Larkin, 1986), self-efficacy beliefs together with ability, academic success, persistence and range of perceived career options were explored for the technical/scientific fields. It was found that self-efficacy expectations related to academic persistence and achievement in addition to vocational interests and perceived career options. This study was criticised (Brown, 1990) for the exclusion of prior college grades, considered to be a major origin of academic self-efficacy expectations.

Self-efficacy theory and two other theoretically-derived career-based variables were compared to determine their predictability for career and academic behaviour (Lent, Brown & Larkin, 1987). It was found that self-efficacy was the most useful predictor of college grades and persistence in the science/engineering field for a one-year period. Further, self-efficacy was more predictive of persistence than ability as measured by PSAT, high school rank and college grades.

The relationship between academic performance, internal goals and self-efficacy has been investigated. For example, self-efficacy was found to be related significantly to academic performance and to internal academic grade goals for undergraduate students enrolled in a management course (Wood & Locke, 1987). Internal goals, in self-efficacy theory, are a source of motivation as students seek to fulfil self-set standards (Wood & Bandura, 1991).

Finally a meta-analysis of the relationship of self-efficacy expectations with academic performance and course persistence was conducted (Multon, Brown & Lent, 1991). From 68 studies conducted between 1977-1988, 39 were used in this study. Only 28.9% of the studies used college students, with the majority using elementary (primary) school students. Overall, the investigation found that self-efficacy expectations accounted for approximately 14% of variance in academic performance and 12% in academic persistence. The study identified four conditions that influence results:

• *time period*, which refers to the elapsed time between self-efficacy and performance assessment,

• *student achievement status,* where it was found that the relationship was stronger for low-achieving students than for students making average progress,

• *subject age*, that is, older students were able to make more accurate self-efficacy appraisals,

• *type of performance measure,* which refers to the type of measure/tool used by the researcher. Better results were obtained if the measure/tool was more specific to the student group being assessed.

2.6.9 Summary

In summary, according to the social cognitive theory, self-efficacy is a concept related to the judgement one makes about one's capability to reach a certain level of performance. It is a concept that views behaviour as being regulated by self-referent thought with efficacy information being obtained from a variety of sources. Self-efficacy is a concept that acknowledges the influences of cognitive, personal, environmental and social factors on the judgements people make about their capabilities (Wood & Bandura, 1989).

Although Bandura's concept of self-efficacy was developed to assist in the understanding and treatment of phobias it was recognised as a theory with wider implications. It has been shown to be relevant to other fields, such as career choice (Betz & Hackett, 1983; Hackett & Betz, 1981; Hackett, O'Halloran & Romac, 1990; Lent, Lopez & Bieshke, 1991), organizational management (Wood & Bandura, 1992), nursing education (Chacko & Huba, 1991; Cooper et al, 1992; Harvey & McMurray, 1994), and academic performance and persistence (Lent, Brown & Larkin, 1984; 1986; 1987).

2.7 Vocational Choice

2.7.1 Introduction

In this section, women's career choices are introduced. This is followed by a discussion of Hackett and Betz's (1981) application of self-efficacy theory to women's career choices. Finally, nursing as a vocational choice is considered.

2.7.2 Women's Career Choices Introduction

Much of the early research on women's vocational behaviour was concerned with the personality variables that distinguished women who chose to "work" (pioneers, career women) from those who chose to stay at "home" (home makers; traditionalists) (Osipow, 1983; Betz & Fitzgerald, 1987).

With the increased participation of women in the workforce, researchers turned their attention to the careers women entered. Occupations were classified as traditional or non-traditional according to the percentage of women present in that occupation. Nursing, as we have already seen, has predominantly female incumbents and therefore is a traditional feminine occupation. In contrast, engineering, with a predominantly male workforce is a non-traditional occupation for women.

Female enrolments in higher education have continually grown faster than male participation rates. In 1980 females comprised 45% of Australian higher education enrolments, but by 1990 this had increased by 8% to 53% (DEET, 1990). Part of this increase is due to the transfer of nursing from hospitals to higher education (DEET, 1993).

There have also been significant changes to the gender composition of some courses such as medicine, veterinary science and law, whilst others have retained their traditional gender composition (DEET, 1993). Nursing, for example, as shown in Table 2.2, has remained a traditional female occupational choice with a female enrolment of 87.5% in Australian undergraduate nursing courses (DEET, 1990). Engineering by contrast, with 9.6% of total female enrolments remains a non-traditional female occupational choice (DEET, 1990).

Table 2.2

1990 Undergraduate Females' Share of Total Enrolments by Field (%)

Field	Enrolment
1 Nursing	87.5
2 Education	75
3 Health Therapies (1)	73.4
4 Arts	69
5 Other (Health) (2)	64.9
6 Optometry, Pharmacy	59.7
7 Veterinary Science	55.8
8 Law	46.3
9 Business	42
10 Medical Science, Medicine	41.9
11 Science	40.2
12 Dentistry	36.5
13 Architecture	34.9
14 Agriculture	33.9
14 Engineering	10.2

Note adapted from Higher Education Series: Female students, Update No.1, May 1991, DEET.

(1) Health Therapies; Dental Therapy, Health Services and Technologies (except Nursing, Optometry and Pharmacy) and Rehabilitation Services.

(2) Health Support Activities and Health-General.

The changes in women's participation rates in some careers has been attributed to the technological changes in society (Stewart, 1994), reduction of some traditional female jobs (Rennie & Parker, 1989) and the increasing participation of women in the workforce (Betz & Fitzgerald, 1987).

Self-efficacy has been applied to women's career choices (Hackett & Betz, 1981; Astin, 1984; Farmer, 1985; Fassinger, 1985; O'Brien & Fassinger, 1993). Hackett and Betz (1981) developed a tool called mathematics self-efficacy which has subsequently been used in various studies investigating women's career choices (O'Brien & Fassinger, 1993). It is considered appropriate to discuss their study in this section.

2.7.3 Hackett and Betz (1981)

Hackett and Betz (1981) applied Bandura's (1977) self-efficacy theory to elaborate some of the ways in which societal beliefs and expectations become entrenched in women's career choices. They proposed that women have a higher self-efficacy for traditional female roles and occupations and lower self-efficacy for non-traditional female career options. This was thought to be due to females':

- reduced involvement in "masculine" behavioural domains, for example, mechanical and spatial skills,

- lack of exposure to a wide variety of occupational female role models,

- higher levels of anxiety in feminine sex-typed persons,

- discouragement from non-traditional pursuits and activities in areas such as mathematics and science (Hackett & Betz, 1981, p333).

Much research was generated from this model (Betz & Hackett, 1983; Betz & Fitzgerald, 1987; Hackett 1985; Hackett, Betz, O'Halloran & Romac, 1990; Lapan, Boggs & Morrill, 1989; Lent, Lopez & Bieschke, 1991). Nevertheless, the model was criticised for not explaining why society places a low value on occupations traditionally chosen by women (Astin, 1984).

Betz and Hackett (1983) developed and tested a mathematics self-efficacy instrument (MSES) that included everyday mathematics tasks, mathematics problems and a list of mathematics-based college courses (subjects/units). Undergraduate students were asked to indicate on a ten-point scale the level of confidence in their ability to successfully perform the mathematics tasks, problems or to get a "grade B" or better on the listed college courses. In this study, students also completed a revised version of the Fenema-Sherman Scale of Math Anxiety and Attitude to Maths and finally the Bem-Sex Role Inventory (BSRI).

Results indicated that the three predictors of choosing a science major were: mathematics self-efficacy expectations; sex; and high school mathematics background. Generally, females had significantly lower mathematics self-efficacy expectations than males. The exception was for three everyday stereotypically female mathematics tasks (for example, sewing, cooking, shopping) where females scored significantly higher than men (Betz & Hackett, 1983).

Mathematics self-efficacy expectations were negatively related to mathematics anxiety and the researchers suggest Bandura's (1977) concept of the "co-effect" of anxiety as an explanation. Also, mathematics self-efficacy expectations were positively related to Masculinity scores but not related to Femininity scores as measured by the BSRI.

Further research (Hackett, 1985; Hackett et al, 1990; Lapan et al, 1989; Lent et al, 1991), based on the Betz and Hackett (1981) model, was generated utilising the MSES and confirmed that females have lower self-efficacy expectations for mathematics and science-based careers.

A gender attitudinal factor not explained by the relationship between students' mathematics background and achievement was noted (Hackett, 1985; Lapan et al, 1989). References were made to socio-economic status, parent and teacher attitudes and school influences as possible explanations (Hackett, 1985).

A student's interest was identified as a further variable related to self-efficacy, with males having a greater interest in mathematics than females (Hackett et al, 1990; Lent et al, 1991). Interest for mathematics tasks and self-efficacy expectations were also found to be related to outcome, that is, success or failure in the task (Hackett et al, 1990). Further, (Hackett et al 1990) success in a task resulted in a generalizability of self-efficacy for an irrelevant task.

2.7.4 Nursing as an Occupational Choice

One can say with certainty that the majority of Australian undergraduate nursing students will be female, single and aged between 16-20 years (Burgum, et al, 1993; Neill & Barclay, 1989; Wright, 1988; Wright & Frew, 1991).

Nursing is perceived as a very feminine occupation (Shinar, 1975) where females have a higher expectancy than males for getting a job (Brooks & Betz, 1990). Males have lower opinions of nursing than females (Grossman, Arnold, Sullivan, Cameron & Munro, 1989; Grossman & Northrop, 1993).

Declining nursing enrolments have been experienced in America with the low status of nursing being attributed as one cause (Ferguson, 1990; Grossman et al, 1989). Further, the changing role of women in society has enabled access to more attractive, higher status non-traditional careers for women (Ferguson, 1990; Grossman et al, 1989).

One of the important influences on nursing as a career choice has been family role models. It has been well established that students entering nursing courses frequently have relatives (most often mother) or friends in nursing (Creighton, 1985; Grossman et al, 1989; Grossman & Northrop, 1993; Mackay et al, 1981; Murray & Chambers, 1990; Stevens & Walker, 1993; Wright & Frew, 1991).

Nursing has an image as a caring profession and therefore it is not surprising to find that students give "caring for/or helping others" as main reasons for entering nursing courses (Creighton, 1985; Mackay et al, 1981). Yet this characteristic attributed to females and termed "affiliation", that is, the need for social company (Horner, 1972), has been shown to academically disadvantage students in undergraduate nursing courses (Dyer, 1987; Nortridge et al, 1992).

Emotional or personal satisfaction has also been cited among the main reasons for entering nursing (Mackay et al, 1981; Neill & Barclay, 1989). Undergraduate students have also been found to nominate "employment opportunities after graduation" and "score insufficient for preferred course" among their first preferences for entering nursing courses (Neill & Barclay, 1989). It is not known whether a student's reason for entering a nursing course is directly related to academic performance in that course. However, it has been suggested that students who choose nursing as a first choice perform better academically than those for whom it was not a first choice (Bishop, 1990).

On entering tertiary and hospital-based nursing courses students have been found to have the following attitudes about nurses, nursing and patients: "that patients are pleasant; nursing is interesting/exciting/important; nurses possess certain characteristics and have feelings of compassion for patients" (Mackay et al, 1981, p17). For most students these attitudes were found to persist throughout the course (Mackay et al, 1981, p52). However, nursing students who withdrew from a course were found to have "different changes in attitudes" to those who continued in the course (Mackay et al, 1981, p17). The relationship between a student's attitudes to nursing and their subsequent academic performance was not investigated.

2.8 Demographic Data

2.8.1 Introduction

In this section the demographic data of age/mature age, and males in nursing are briefly outlined with reference to academic performance in undergraduate nursing courses.

2.8.2 Age/Mature Age

The majority of nursing students are aged between 16-20 years (Burgum et al, 1993; Neill & Barclay, 1989; Wright, 1988; Wright & Frew, 1991). This is in accordance with Australia-wide statistics for students entering undergraduate courses (DEET, 1992).

As previously discussed in section 2.3.3, age has been found to be related to academic performance in one study (Mills et al, 1992) but not in another (Horns et al, 1991).

Related to age is the mature age student category. Mature age students are defined by DEET (1990) as those "who commence an undergraduate course of study at higher education other than directly or one year after completing year 12". In this category, the students' mean age is reported as 28 years, although half of these students are below the age of 25 years (DEET, 1992).

Mature age students may enter higher education several ways. One of these ways is via "mature-age entry" schemes and 14% of students in 1989 were found to enter undergraduate courses via this means (DEET, 1990). In 1989, 26% of mature age students entered via other "special entry" schemes. Most mature age students entered via normal entry requirements (DEET, 1990).

In 1991, 40% of students entering undergraduate nursing courses were mature age students. This was below the Australia-wide average of 47% for mature age students entering all undergraduate courses (DEET, 1992).

Mature age students have been found less likely to finish their undergraduate courses (Martin, 1994 p143; West, Hore, Bennie, Brown & Kermond, 1987). This has also been found to apply to those in nursing (Lewis, 1983).

Nevertheless, mature age students have been found to be motivated to academically succeed in the first year of an undergraduate nursing course (Caon & Treagust, 1992).

2.8.3 Males in Nursing Education Courses

It has been suggested that the percentage of males entering nursing has increased (Wright, 1988). Certainly only 4.3% of males attempted the nurse registration examination in 1975 (Quine, 1977), which means they were completing their nurse training. In Table 2.3 the number of males entering a higher education course can be seen to vary from 9.3 to 12% (Burgum et al, 1993; Mackay et al, 1981; Neill & Barclay, 1989; Wright & Frew, 1991); however, little is known about the percentage of males completing nursing education in the tertiary sector.

There is also a lack of information about the academic performance of males, although there is evidence to suggest that it has changed with the move to higher education. Whilst males attempting nursing registration examinations in the late 1970s (Quine, 1977) were found to perform academically well, males in higher institutions have been suggested to have difficulties with this type of course (Burgum et al, 1993). Of eleven males (10.3%) enrolled in an undergraduate nursing course only eight (6.7%) continued with their nursing studies full-time (Burgum et al, 1993).

Table 2.3

Males in Nursing Education Courses

Year (Study, Year, State)	Entry%	Exit%
1975 (Quine,1977, NSW)	na	4.3 (1)
1977 (Mackay et al, 1981, Vic)	12	na
1988 (Neill & Barclay, 1989, SA)	11	na
1988 (Burgum et al, 1993, Vic)	10.3	6.7 (2)
1989-1990 (Wright & Frew, 1991, Vic)	9.3	na
1990 (DEET, 1991, total Aust enrolments)	12.5	na

(1) Students sitting NSW Nurses Registration Examination
(2) at end of first year

2.9 Social Characteristics

2.9.1 Introduction

In this section the socio-economic factors relating to nursing students and their academic performance are discussed.

2.9.2 Socio-Economic Background of Nursing Students

When nursing moved to tertiary institutions, students were no longer paid a salary as they were for hospital-based training courses. Rather, they must rely on governmental or parental support for financial assistance during their undergraduate studies.

Historically, higher education has been known to discriminate against students from lower socio-economic backgrounds. Australian Bureau of Statistics (ABS) figures for 1992 indicate that persons from lower family income groups (one indicator of socio-economic background) are less likely to be participating in higher education institutions. In addition, 66% of students in tertiary education attended non-government schools in the previous year compared with 49% students from government schools (ABS, 1992, p135).

A number of studies (Neill & Barclay, 1989; Wright, 1988; Wright & Frew, 1991) were conducted during the transitory phase when hospital and college programs were being conducted concurrently. These studies aimed to establish the accessibility of nursing for all socio-economic groups after the move to tertiary institutions. Some (Wright, 1988; Wright & Frew, 1991) were aiming to collect data about students in hospital-based programs before they ceased to exist. In NSW (Wright, 1988) it was found that college programs "had widened the recruitment across all socio-economic levels", whereas in South Australia (Neill & Barclay, 1989) students were found to be coming from more privileged backgrounds. Geographic location was proposed as an explanation for the differences in the research findings (Neill & Barclay, 1989).

The different findings for these studies (Neill & Barclay, 1989; Wright & Frew, 1991) may highlight a common problem when comparing studies that have employed different socio-economic indices. However, the differences may also be attributable to the fact that the move to tertiary institutions was in different stages in both states. In NSW hospital intakes had ceased in 1985 (Wright, 1988) and therefore the only option for nursing students was to enter higher education courses. In contrast, the South Australian students could still choose between hospital-based and higher education courses as they continued concurrently until the early 1990s.

Due to different societal expectations for women, socio-economic background has been found to be a less reliable predictor of occupational aspiration than it has been traditionally for males (Betz & Fitzgerald, 1987). In fact, it has been suggested that "While high socio-economic status families are very likely to encourage and facilitate achievement related behaviours in their sons, the extent to which they do so in their daughters is probably a function of parental attitudes and beliefs with regards to women's roles in society and possibly the presence or absence of sons in the family" (Betz & Fitzgerald, 1987, p38).

This fact was confirmed by a study of Australian school students (Carpenter & Western, 1989) which found that there was a non-linear relationship between a father's socio-economic background and his daughter's transition to higher education. The researchers found that females from working class backgrounds were more likely to enter higher education where this opportunity was available. This scenario was increased if they attended a non-government (Catholic) school. On the other hand, sons of fathers from the upper or lower professional and managerial group were more likely to enter higher education. Another study, however, found that females from upper socio-economic backgrounds who attended non-government schools were more likely to consider entering higher education institutions (DEET, 1993).

Whilst nursing is regarded as a predominantly female profession, little is known about the status or influence of mothers on nursing students. Socio-economic studies have usually collected data about fathers' education (Wright, 1988; Wright & Frew, 1991). Neill and Barclay (1989) found in their sample of nursing students at higher education courses in South Australia, that only 40% of mothers were engaged in home duties and that fathers were more likely to have baccalaureate or higher degree than mothers.

2.9.3 Socio-Economic Background and Academic Performance

Studies of socio-economic background and academic performance have shown mixed results. When using post-codes as an indicator of socio-economic status (SES) students from low SES backgrounds were found to be less academically successful than other students (Martin, 1994, p143).

Yet, when type of high school attended was taken as an indicator of SES, it was found that students from non-government schools do not perform as well as students from government schools in the first year of tertiary education (West, 1985). Moreover, they were shown to be more likely to withdraw or change to part-time education (West, et al, 1987).

Thus it has been suggested as a possible explanation for these results, that the background of students from higher socio-economic levels may hinder their ability to function independently or study in higher education courses (West, 1985). Also, coaching of less "academically able" students from non-government schools may increase the achievement of these students in the HSC (West, 1985, p168).

Carpenter and Western (1989) found that working class females have strong career orientations toward higher education, and when given this opportunity they are likely to persist in a course.

In nursing, it has been established that students from lower socio-economic backgrounds who completed a course for "own self development" performed better academically than students with higher aspirations (Burgum et al, 1993).

2.10 Conclusion

A review of the literature demonstrates that students' academic performance is linked to many factors other than their academic entry qualifications. These non-academic factors have been grouped into categories of demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy. The relationship between these factors and students' academic performance is examined in the following chapters.

CHAPTER THREE

METHOD

CHAPTER 3: METHOD

3.1 Introduction

Academic entry qualifications of nursing students have been shown to be unsatisfactory in the prediction of academic success in undergraduate nursing courses. For many students non-academic factors, particularly motivation, will be extremely important for academic success.

Therefore, in this study, non-academic factors and their relationship with academic success in the first year of an undergraduate nursing course were investigated. Through a literature review given in Chapter Two, some non-academic factors were identified as possible predictors of success. These factors were grouped into the categories: demographic data, social characteristics, vocational choice, gender characteristics, and self-efficacy.

Bandura's social cognitive theory (1986) was used in the study to examine the self-efficacy expectations of first year nursing students for science, first year subjects and completion of the course. These self-expectations may reflect a student's motivation for academic success and hence be a predictor of academic success in the first year of an undergraduate nursing course.

This chapter begins with a review of the research design including the variables for investigation in this study. The research hypotheses for the study are then listed. The section on the research instrument has a description of the data collection tools. Also included in this chapter is an outline of the data collection, data entry and statistical analysis of the study.

3.2 Research Design

3.2.1 Introduction

In the study, the independent variables for investigation have been grouped into the categories of academic entry qualifications, demographic data, social characteristics, gender characteristics, vocational choice and self-efficacy. All of these categories have been discussed in Chapter Two and identified as non-academic factors that may be predictors of academic success in undergraduate courses. The dependent variable of academic performance is introduced in this section.

3.2.2 Variables for Investigation

Academic Entry qualifications

The variables for investigation were: a student's TER score, subjects studied and grades or score obtained for the HSC/TER. Where entry to university was gained through TAFE qualifications, TAFE subjects and score or grade were considered in this category.

Demographic Data

This category included a student's age, gender and marital status. Type of study was ascertained by measuring whether the student was studying part-time or full-time. The means by which a student gained entry into university, that is through HSC/TER, TAFE qualifications, mature-age or other entry, was considered a demographic variable. Ethnicity was determined by the usual language spoken at home and birthplace of the student and parents.

Social Characteristics

Social characteristics were considered to be those factors related to students' socio-economic background. This sub-section included: parental (mother's and father's) level of schooling and occupation, the type of schooling (government/non-government; single-sex/co-educational) attended by the student in their final year of schooling and sources of financial support while attending university.

Vocational Choice

The major reason for deciding to do a nursing course, whether the course was a first preference, when the decision to nurse was made and students' attitudes to nursing, were the variables for this sub-section.

Gender Characteristics

This category included degree of endorsement of masculine and feminine characteristics as measured by the Bem Sex-Role Inventory and attitudes to feminism.

Self-Efficacy

The strength of a student's self-efficacy for science tasks, first year subjects and course completion were included in this sub-section. The science tasks were sub-divided into areas of masculine, feminine, neutral and mathematic-science tasks. Self-efficacy was both an independent and dependent variable in this study.

Academic Performance

Grades and marks obtained for all first year subjects were included in this category which constituted the dependent variables for the study. This sub-section also included derived measures called the Grade Point Average, Weighted Average Mark and Average Mark.

3.3 Research Hypotheses

3.3.1 Introduction

The main research hypothesis in this study is that non-academic variables are predictors of success in an undergraduate nursing course The research sub-hypotheses are listed under the non-academic categories: demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy.

3.3.2 Demographic Data

(1) That males and females have different self-efficacy strengths for science.

(2) That students with parents born overseas (excluding UK/NZ) perform better in first year subjects than students with parents born in Australia/UK/NZ.

(3) That a student's age is related to academic performance.

(4) That students with "mature-age/other" entry to the course perform better academically than school leavers.

(5) That a student's marital status is related to academic performance.

3.3.3 Social Characteristics

(6) That students from lower socio-economic backgrounds perform better academically than students from higher socio-economic backgrounds.

(7) That females from single sex-schools have a higher self-efficacy for science than females from co-educational schools.

3.3.4 Vocational Choice

(8) That students who choose the course as a first preference perform better academically in NURS121 than those for whom it was not a first choice.

(9) That students' reasons for choosing nursing are related to their attitudes to nursing.

(10) That students' attitudes to nursing are related to academic performance in NURS121.

3.3.5 Gender Characteristics

(11) That students' BSRI Masculinity scores are related to self-efficacy for science.

(12) That students' BSRI Masculinity scores are related to self-efficacy for SCIE111 and NURS124.

(13) That a student's BSRI Masculinity score is related to academic score for SCIE110, SCIE111 and NURS124 ("masculine-typed" subjects).

(14) That students' with a high BSRI Femininity score achieve lower academic grades in SCIE110, SCIE111 and NURS124.

(15) That students' BSRI Femininity scores are related to self-efficacy for NURS121.

(16) That, for female students, a positive attitude to feminism is related to BSRI Masculinity score .

3.3.6 Self-Efficacy

(17) That a student's self-efficacy for science is related to academic performance in science-based first year subjects (SCIE110, SCIE111).

(18) That students with better grades in HSC science subjects also have higher self-efficacy for science.

(19) That students who have failed SCIE110 have a low self-efficacy for SCIE111.

(20) That a student's self-efficacy for second (Spring) session subjects is related to academic performance in that subject.

(21) That self-efficacy for a subjects is related to a student's degree of interest in that subject.

(22) That students who chose nursing as a first choice have a strong self-efficacy for course completion.

3.3.7 Null Hypothesis

That non-academic variables are not predictors of academic performance in the first year of an undergraduate nursing course.

3.4 Selection of Cohort

3.4.1 Introduction

In this section the location of the study, student cohort and curriculum is described.

3.4.2 Location of The Study

The study was undertaken at the University of Wollongong which is a coastal city in the Illawarra region of New South Wales. Sydney is about 80 kilometres north of Wollongong (University of Wollongong, 1994).

Bachelor of Nursing courses have been conducted at the University since 1992. However, undergraduate nursing education actually began in this institution in 1988 with the introduction of a Diploma in Applied Science (Nursing) course. This was subsequently phased out and replaced by the present course. Intakes of students are approximately 100 with students coming from the Illawarra and other regions of New South Wales.

3.4.3 Student Cohort

At the beginning of the first (Autumn) session of 1994, ninety five students were enrolled in the annual first year subject NURS121 at the University of Wollongong. This cohort consisted of 14 males (14.7%) and 81 females (85.3%). The median TER score for the cohort was 60.00, with the cut-off being initially set at 60.05. The Bachelor of Nursing median TER and cut off TER scores for 1990-1994 are shown in Table 3.1. There was a slight decrease in 1994 from the previous year's (1993) median and cut-off TER score (Table 3.1). However, the TER median and cut-off scores have been steadily climbing with a 24.1% increase in median TER scores from 1990-1994. Nevertheless, the median TER score for the Bachelor of Nursing was the lowest in the University.

Table 3.1

University of Wollongong Median and Cut-Off TER Scores for the Bachelor of Nursing from 1990 - 1994

Year	Median TER Score	Cut-Off TER Score
1990	45.55	26.50
1991	45.00	39.75
1992	54.95	51.35
1993	62.85	60.60
1994	60.05	60.00

(Source: Department of Planning and Information, University of Wollongong, 1994)

A comparison of the median TER score for the Bachelor of Nursing and selected disciplines is shown in Figure 3.2. As many courses are conducted at the university, those listed have been chosen for various reasons. The course with a comparable median TER score is the Diploma of Computing Applications (full-time). Both courses are well below the next median TER score of 68 for a Bachelor of Science. The Bachelor of Teaching-Bachelor of Education (Primary) and Bachelor of Arts are courses that, like nursing, traditionally have a majority of female participants. They have median TER scores of 71.35 and 72.25 respectively. These scores are below the Bachelor of Engineering, a course listed in this Table as a contrast because it is one that traditionally has a majority of male participants. With a median TER score of 33 points higher than nursing, the Bachelor of Arts-Bachelor of Laws has the highest median TER score for the university.

Table 3.2

Comparison of University of Wollongong 1994 Median TER Score for Nursing and Selected Disciplines

Course	Median TER Score
Bachelor of Nursing	60.05
Diploma in Computing Applications (Full-Time)	60.60
Bachelor of Science	68.00
Bachelor of Teaching-Bachelor of Education (Primary)	71.35
Bachelor of Arts	72.25
Bachelor of Engineering (Electrical)	79.93
Bachelor of Arts-Bachelor of Laws	93.60

(Source: Department of Planning and Information, University of Wollongong, 1994)

By the beginning of the second (Spring) session, nine students had left the course (three males, six females). Seven students left during the first session and two left before the commencement of the second session. The cohort subsequently had eighty-six students enrolled in NURS121, and was comprised of eleven males (12.8%) and seventy-five females (87.2%).

3.4.4 Course Curriculum

Three Year Course Curriculum

The undergraduate nursing course at the University of Wollongong requires three years of study and satisfactory completion of designated subjects before the award of Bachelor of Nursing is made. Successful students may then apply for nurse registration in NSW. The three year curriculum is shown in Figure 3.1.

Figure 3.1

1994 Bachelor of Nursing Curriculum

Subject	Number	Credit Points	Session Offered
First Year			
Foundations of Nursing Care	NURS121	16	Annual
Professional Studies	NURS122	8	Annual
Introductory Psychology for Nurses	NURS123	6	1
*Human Bioscience 1	SCIE110	6	1
*Human Bioscience 2	SCIE111	6	2
*Introduction to Research	NURS124	6	2
Second Year			
Acute Care Nursing	NURS222	8	Annual
Acute Care Nursing Practice	NURS223	8	Annual
Human Bioscience 3	SCIE210	6	1
Sociological Dimension of Nursing	SOC111	6	1
Research Design Methodology	NURS224	8	1/2
Third Year			
Mental Health/Psychiatric Nursing Theory and Practice	NURS321	6	1
Developmental Disability: Theory and Practice	NURS322	6	1
Maternal and Child Care Nursing Theory and Practice	NURS323	6	1/2
Community Development Nursing Theory and Practice	NURS325	6	1/2
Community Health Nursing: Theory Research and practice	NURS326	6	1/2
Health and Human Ecology	NURS327	6	1/2
Nursing Resources Management	NURS328	6	1/2
Preparation of Professional Practice	NURS324	6	2

(University of Wollongong Undergraduate Calendar, 1994, p502-503)

First Year Course Outline

In the first session (Autumn), students are introduced to Psychology (NURS123) and Human Bioscience 1 (SCIE110) which contains aspects of physics and chemistry. In the second session (Spring), students are introduced to research (NURS124) and continue with Human Bioscience 2 (SCIE111) which includes microbiology and basic biological functions of the body (Figure 3.1). The subjects, Foundations of Nursing Care (NURS121) and Professional Studies (NURS122), are annual subjects (includes both first and second session). The subject, Professional Studies, covers all aspects of communication including patient/client interactions and computer literacy and written communication issues.

In Foundations of Nursing Care (NURS121), students are introduced to aspects of nursing practice and nursing skills. Tutorials, are compulsory and Nurs121 is a prerequisite for the second year subjects NURS222 (Acute Care Nursing) and NURS223 (Acute Care Nursing Practice).

The subjects, Human Bioscience I and 2 (SCIE110, SCIE111), are conducted by staff from the departments of Physics, Chemistry and Biology. All other subjects are taught by staff of the Nursing Department.

All first year subjects in Figure (3.1) denoted by an asterix* are taught by males. If we consider these subjects to be "masculine" as discussed in Chapter Two then in this curriculum all masculine first year subjects are taught by male staff.

3.5 Research Instrument

3.5.1 Introduction

A questionnaire was designed which covered the non-academic factors identified as possible predictors of academic success in the first year of an undergraduate nursing course (Appendix 14). The questionnaire incorporated a consent form. It also had various research tools which are outlined in this section including: the Bem Sex-Role Inventory (BSRI), Attitudes to Feminism, Self-Efficacy for First Year Subjects (SEFFYS), Self-Efficacy for Course Completion (SECC), the Self-Efficacy for Science (SS) and the Attiudes to Nursing (AN). The SS and AN were researcher-developed tools.

3.5.2 Self-Efficacy Introduction

Self-efficacy is a concept derived from Bandura's (1977; 1986) social cognitive theory which was discussed in detail in Chapter Two. A person's motivation for a task is considered to be related to their beliefs about their ability to achieve that task. The stronger a person's self-efficacy is, the more likely they are to persist despite set-backs.

Only a few tools for measuring self-efficacy have been employed in nursing education. The LASSI, for example, is an American tool that was modified to be used for American undergraduate nursing students. However, self-efficacy is only a sub-scale of a few items on this tool designed to measure students' learning strategy and study skills.

An Australian nursing academic self-efficacy scale (NASES) has been developed, however it was not published until November 1994, well after this study had commenced. The NASES was documented as containing a total of twenty-two science, basic nursing constructs, and microbiology/anatomy items. The NASES was not used to predict students' academic performance. It has less items than the SS and was not designed to measure self-efficacy for science tasks.

The self-efficacy tools used in this study are based on the procedures used by Hackett and Betz (1983) when investigating mathematics self-efficacy. The methodology was also employed by researchers when investigating academic performance and persistence (Lent, Brown & Larkin, 1984; 1986; 1987) and research self-efficacy (Phillips & Russell, 1994).

3.5.3 Self-Efficacy for Science (SS)

Nursing students have difficulties with their science subjects in undergraduate nursing courses (Bishop, 1990; Caon & Treagust, 1992; Cooper et al, 1992; Kershaw, 1989). In addition, undergraduate nursing students have a low opinion of their ability to study science (Caon & Treagust, 1993). A student's self-efficacy expectations for science may be useful in the prediction of academic success in the first year of an undergraduate nursing course.

The SS, a researcher-developed tool, was devised to determine a student's strength of self-efficacy for science (SS), an aspect considered important in the first year of an undergraduate nursing course. It was anticipated that a measure of the strength of students' self-efficacy for science would be related to academic performance in the science subjects.

The idea to use practical everyday science tasks to measure self-efficacy was gleaned from the research on mathematics self-efficacy expectations conducted by Betz and Hackett (1983). They found that females were not confident in performing mathematics tasks and those tasks that were gender-stereotyped resulted in higher self-efficacy expectations for the appropriate gender.

The SS included twenty-one science tasks (see Appendix 2). Many were every day science tasks, however, some included course-specific science-orientated tasks. Respondents were asked to indicate on a scale of one (not confident) to five (very confident) their confidence in their ability to successfully perform each of the tasks. Although not identifiable to the respondent, the SS items can be divided into sub-sections of neutral (5 items), masculine (5 items), feminine (5 items) and mathematics-science (6 items) tasks (Appendix 3).

The masculine and feminine items have been chosen to reflect societal gender-specific tasks. It is stressed, however, that overall the science items are not designed to be gender-biased, rather to test the science self-efficacy expectations of all undergraduate nursing students. Neutral science items cover general science tasks designed to appeal to all students. Masculine, feminine and neutral items are based on chemistry and physics principles which are applied to everyday tasks, some of which also directly apply to nursing. The mathematics-science sub-section includes items that have mathematics applied to science. Some of these items are specific to nursing and they cover areas of physics, chemistry and biology. Figure 3.2 has examples of each of the sub-sections of the SS.

Figure 3.2

Examples of SS Science Sub-Sections

Neutral Science (NS)

24 Dissolve sugar in a drink by changing the drink's temperature.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

Masculine Science (MS)

Work out if a 120V electric razor (bought in the U.S.A.) would work if plugged into your electrical power point.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

Feminine Science (FS)

Decide whether a still or windy day is better for drying your clothes.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

Mathematics Science (MAS)

Calculate whether the 4kW electrical circuit in your kitchen will enable you to run a 2.4kW space heater, 600W toaster and a 1200W kettle.

Not confident ❑ ❑ ❑ ❑ ❑ Very confident

3.5.4 Self-Efficacy for First Year Subjects (SEFFYS)

This sub-section was adapted from the Betz and Hackett (1983) study where college students were asked to indicate their confidence in their ability to complete college courses (subjects) with a grade "B" or better (p332).

In this study, students were asked to indicate their confidence, on a scale of one (not confident) to five (very confident), of completing first year (second session) undergraduate nursing subjects with a grade of credit or better (Appendix 14, Q10-13).

3.5.5 Self-Efficacy for Course Completion (SECC)

This sub-section was designed to determine a student's long term expectations for their undergraduate nursing course. Students were asked to indicate their confidence in completing their nursing degree on a scale of one (not confident) to five (very confident) (Appendix 14, Q20).

3.5.6 Bem Sex-Role Inventory (BSRI)

Bem (1974) hypothesised that it was possible for individuals to possess both feminine and masculine personality characteristics. She devised the Bem Sex-role Inventory (BSRI) to measure these characteristics. The tool consists of sixty items, twenty each of feminine, masculine and neutral personality attributes. In this study, only the feminine and masculine items were used (see Appendix 14, Q45-84). Respondents are asked to indicate on a scale of one (never or almost never true) to seven (always or almost always true) how well each of these statements describes themselves. By summing appropriate items, it is possible to obtain a Masculinity and Femininity score.

The difference between a person's Masculinity and Femininity score is "subject to a t-ratio test", thus the extent to which a person's self-image is sex-stereotyped can be determined (Pontin, 1988, p771). For example, a person is said to be feminine if the Feminine score is significantly greater than the Masculine score or vice-versa for masculinity. If a person's Masculinity and Femininity scores are equal then the person is considered androgynous (Bem, 1974; Pontin, 1988). Later a fourth category, where a person's Masculinity and Femininity scores were equally low, was introduced and called "undifferentiated" (Bem, 1977). Alternative scoring methods were devised by various researchers (Spence et al, 1975; Motowildo, 1981).

The BSRI has been extensively used since its development and a female's Masculinity scores have been shown to be related to self-efficacy expectations for mathematics (Betz & Hackett, 1983), career motivation (Farmer, 1985) and career choice (Fassinger, 1985; O'Brien & Fassinger, 1993).

Science (especially physics and chemistry) have a traditionally masculine image and nursing students have consistently been found to have difficulties with these areas in undergraduate nursing courses. Therefore, the relationship between a student's masculine and feminine attributes, and the masculine areas of the curriculum and academic achievement were investigated in this study.

3.5.7 Attitudes to Feminism

This tool was adapted from Fassinger's 1985 study. Fassinger (1985) used two questions about attitudes to feminism in order to determine college students' overall sex-role attitudes. The first question referred to the use of the title Ms and the second (from Smith & Self, 1981) was about the use of the "feminist" label. The responses for her study were measured on a four-point Likert scale with higher scores indicating "more liberal sex-role attitudes" (Fassinger, 1985, p132).

Fassinger found that a commitment to feminism was a strong predictor of college women's career choices. In other words, females who were committed to feminism were more likely to choose non-traditional female careers. The use of the feminist label was also found to be related to adolescent females' career orientation and choice (O'Brien & Fassinger, 1993).

In this study females were asked to respond yes/no to the use of the title Ms and the label feminist (Appendix 14, Q86-87).

3.5.8 Vocational Choice

Vocational choice was measured by three specific items and the AN tool which is discussed in the following section (3.5.9). The first item related to the major reason for deciding to do a nursing course. Students were given a list of eight options (Appendix14, Q21). Neill and Barclay (1989) found that undergraduate students were most likely to cite personal satisfaction as a major reason for choosing a nursing program.

The second item referred to the course as a first preference with students given a yes/no option (Appendix14, Q22). Bishop (1990) found that students who select nursing as a first choice tended to perform better academically than those for whom it was not a first choice. On the other hand, Harvey and McMurray (1994) found that nursing as a first choice did not significantly affect nursing self-efficacy.

The third item referred to when the decision to nurse was made, with students given four options (Appendix14, Q23).

3.5.9 Attitudes to Nursing (AN)

Nursing students entering nursing courses have been found to have the following attitudes about nurses, nursing and patients: that patients are pleasant; nursing is interesting/exciting/important; nurses possess certain characteristics and have feelings of compassion for patients (Mackay et al, 1981, p17). These attitudes were measured by the Nursing Attitude Inventory (NATTI) which contains 71 items about nursing, nurses and patients, with students' responses were recorded on a 7-point scale containing adjectives to describe a statement, for example, "beautiful-ugly, kind-cruel, simple-complex" (Mackay, 1981, p16).

In the Mackay et al study (1981, p17) students were surveyed on entry, at six-monthly intervals and exit of tertiary and hospital based courses (Mackay, 1981, p17). Students who experienced a change in attitudes withdrew from the course whereas those who remained had consistent attitudes throughout the course (Mackay et al, 1981, p52). The results for the NATTI indicate that the tool was tapping into attitudes relevant to the persistence of students in nursing. The relationship between these attitudes and academic performance was not investigated.

The Attitudes to Nursing (AN) was a researcher developed tool containing nine statements about nursing. The AN was designed to assist in the prediction of students' academic performance in an introductory nursing subject in the first year of an undergraduate nursing course. Respondents were asked to indicate on a scale from one to five, with one considered a low/inappropriate response and five a high/most appropriate response, their attitudes to each of these statements (Appendix1). Some of these statements were based on the NATTI findings although the statements nursing is interesting/exciting were taken directly from these findings (Mackay et al study, 1981). The NATTI tool was not available for this study.

The AN statements "caring for sick people" and "helping a patient to recover from an illness" and "nursing involves team work" were developed to measure the certain characteristics of nurses/nursing. "Talking to a patient" and "explaining a procedure to a patient" were designed to measure feelings of compassion for patients. "Relatives of patients" and "nurses need to understand reasons for their actions" were designed to determine an understanding of psychology in nursing. Appendix1 contains the AN tool.

Figure 3.3 has a sample item of the attitudes to nursing (AN) tool

Figure 3.3

Sample Item: Attitudes to Nursing

1 Caring for sick people is:

Tedious				Rewarding
❑	❑	❑	❑	❑

3.5.10 Socio-Economic Status (SES)

The socio-economic status of students was determined by three items. The first item referred to the type of secondary school attended by students in their final year. Respondents were given three options: state/public, private (catholic) and private (other) (appendix 14, Q95).

Figure 3.4

Occupational Categories of Mother/Father

Code	Occupation
1	Managerial and Administrators
2	Professional
3	Para-Professional
4	Tradespersons
5	Clerks
6	Salespersons and Personal Service Workers
7	Plant and Machine Operators and Drivers
8	Labourers and Related Workers
9	Home Duties
10	Retired
11	Invalid
12	Nursing
13	Deceased
14	Unknown
15	Student
16	Pension

(Source: code 1-8 ABS, 1991, p 43. See this reference for actual occupations included in these categories)

In the second item, students were asked to specify their father's and mother's occupation. (appendix 14, Q100). These responses were then coded according to the eight occupational categories used by the Australian Bureau of Statistics (ABS, 1991, Figure 3.4). Eight additional categories were added to cover those responses not included in the ABS categories (Figure 3.4). A separate category for nursing was initially included in the analysis (Figure 3.4, item 12). This enabled an assessment to be made of the number of students with parents who are nurses, as students entering nursing courses frequently have relatives or friends in nursing (Creighton, 1977; Mackay et al, 1981; Wright & Frew, 1991).

The third item referred to respondents' mother's and father's highest level of education as shown in figure 3.5

Figure 3.5

Parent's Highest Level of Education

Code	Educational Qualification
1	Degree
2	Trade Qualification/Certificate/Diploma
3	Completed highest level of secondary school available
4	Did not complete highest level of secondary school available

(Source: adapted from ABS educational attainment categories, ABS, 1991, p10)

3.6 Data Collection

3.6.1 Introduction

In this section, the methods employed for data collection are outlined. It contains discussion about the sample cohort, and the collection of students' academic results. The section begins with an outline of a case study conducted to test the questionnaire design.

3.6.2 Case Study of Questionnaire

A case study was undertaken to test the questionnaire design. The questionnaire was administered to two second year nursing students during the second semester of an undergraduate nursing course. The students were observed during the completion of the questionnaire in an effort to identify user-difficulties. This method is useful in the detection of difficulties or problems with the questionnaire (Burns & Grove, 1993).

Clues of difficulties include taking a long time over an item, looking perplexed or hesitation in completing an item. During the procedure and afterwards, the respondent is asked about any areas of difficulty or uncertainty. An important area under observation, was students' willingness to give permission to obtain results for all first year subjects, which was important for the conduct of this research study.

This method identified the need for additional response boxes for the TER score and score or grade for HSC/TER which were incorporated into the final design of the questionnaire. The students' responses to the questionnaire items were examined carefully but no further problems were identified.

3.6.3 Sample Cohort

The sample in this study was a cohort of first year undergraduate nursing students enrolled in the subject NURS121. This subject is an annual one and satisfactory completion is a necessary requirement for nurse registration. As tutorial attendance is compulsory and a doctor's certificate is required for non-attendance, it was decided to distribute the questionnaire during this time to maximise the response rate.

The students were surveyed during the second session of the first year of a three year undergraduate nursing course. The questionnaire was administered over three consecutive days to the five tutorial groups comprising NURS121. Students were made aware that participation in the survey was voluntary.

Of the 86 students enrolled in NURS121, 81 (94%) students completed the questionnaire. Thus, the sample was comprised of 70 females and 11 males. Four students were absent and did not participate in the survey.

Consent was obtained from 66 (77%) students for the collection of their grades and/or marks for all of their first year undergraduate subjects. This represented 100% of the males and 73% of the females enrolled in the subject NURS121.

3.6.4 Academic Results

A consent form for the collection of students' grades and/or marks for first year subjects was incorporated into the questionnaire. The consent form required a student's identification number and signature. Only the student's identification number was used for the collection of academic results.

All respondents' questionnaires and consent forms were coded for confidentiality and anonymity. The consent forms were detached and stored separately from the questionnaire. The survey was approved by the University of Wollongong Human Research Ethics Committee.

When required, a list was made with the consenting student's identification on the far left and a researcher's code on the far right. Space was left for the recording of academic results. Appropriate academic staff were approached for the collection of students' academic results. After completion of the list, the left side (student identification number) was detached to maintain student anonymity.

Academic results for the first session were collected early in the second session. The second session academic results were collected between the end of this session and before the commencement of the second year of study. In the study, 66 students enrolled in NURS121 consented to the collection of their academic grades/marks.

3.7 Statistical Analysis

3.7.1 Introduction

In this section, the methods used in the statistical analyses of the data are described.

All computing was carried out by the use of the SAS computer package (1988). Simple descriptive statistics of means and standard deviations (SD) were obtained for each of the variables. A Principal Component Factor Analysis was performed to explore the interrelationships amongst academic performance in the first year subjects.

Parametric and nonparametric statistical methods were used to analyse the research data. Nonparametric methods are less powerful, that is, able to detect differences and relationships, than the corresponding parametric methods when the data are from normal or approximately normal distributions (Burns & Grove, 1993; Howell, 1992). However, they are based on less assumptions than the parametric methods, and can be more robust and powerful in situations where the distribution is not normal (Burns & Grove, 1993; Howell, 1992).

Various statistical techniques were used to analyse the research hypotheses including: Spearman-Rank Order Correlation, Analysis of Variance, Kruskal-Wallis test, Chi-Square, t-test and Wilcoxon signed-ranks test.

Spearman Rank Order Correlational Analysis a non-parametric test was employed in hypotheses 3, 9, 10, 11, 12, 13, 14 and 17 to indicate the degree of relationship between the two ranked variables being investigated (Siegel & Castillan, 1988, p244; Howell, 1992, p275).

Analysis of Variance or one-way ANOVA was employed to compare the means of a variable for several groups (Moore & McCabe, 1988). This statistical technique was used for hypotheses 3, 6 and 19. A nonparametric test, the Kruskal-Wallis, which is an alternative to the one-way analysis of variance by ranks, was used to confirm these results (Minium, 1978, p460).

The Chi-Square test was used for hypotheses 20, 21 and 22 to see if the variables being examined in these hypotheses were related or independent of each other (Siegel & Castellan, 1988, p45; Burns & Grove, 1993, p499).

The t-test was used to test the statistical significance of the differences between the two groups being examined in hypotheses 1, 2, 4, 5, 6, 7, 8, 16, 18 and 20 (Burns & Grove, 1993, p507). The Wilcoxon signed-ranks test, a nonparametric statistical test, was also performed for each of these hypotheses (Burns & Grove, 1993, p520).

The statistical significance level of the conventional alpha=0.05 has been used for this study to limit the Type 1 errors caused by rejecting the null hypothesis when it is in fact true. However, Type 2 errors, caused by accepting the null hypothesis when it is in fact false, can still occur, hence the power of the study was determined (Howell, 1992, p89-92).

Whilst the alpha level gives the probability of falsely rejecting the null hypothesis, the power of a statistical analysis is the "probability of correctly rejecting a false null hypothesis", that is, correctly concluding a relationship exists (Howell, 1992, p205). The results for the cohort are based on the observations for 81 students, unless otherwise indicated. However, attention is drawn to the fact that the number of students in the study with complete academic results was 66. For this study, the sample size of 66 has a power of 70% for a correlation of 0.30 when the conventional alpha of 0.05 is used. In other words, the results based on the sample of 66 have a 70% probability of identifying a factor that explains 10% or more of the variance in academic performance (Howell, 1992, p258).

In addition results at the alpha 0.1 level should be noted, as, with a larger cohort they might in fact indicate a relationship between the variables being examined.

The specific statistical analysis pertaining to academic performance, the BSRI, AN self-efficacy and the SS are detailed in the following sub-sections.

3.7.2 Academic Performance

Academic performance refers to a student's academic results for their first year undergraduate subjects. As NURS121 and NURS122 are annual subjects they are awarded grades at the completion of the second session.

A distinction must be made between first and second session/overall academic results. Henceforth academic results for NURS121(1) and NURS122(1) refer to those for the first session only and NURS121(A) and NURS122(A) refer to the second session/annual and therefore "official" results for these subjects.

In addition to academic score (mark) and grade for a subject, students' overall academic performance was calculated. To measure overall academic performance, the average mark (AM) grade point average (GPA) and weighted average mark (WAM) were calculated.

Average Mark

Average Mark (AM) was calculated by summing the marks for subjects studied and dividing by the total number of subjects completed by a student.

$$AM = \frac{\text{sum of marks}}{\text{total no. of subjects}}$$

Grade Point Average

A grade point average (GPA) was calculated by assigning points for a student's grade obtained for a subject. These points were assigned as shown in Figure 3.6.

Figure 3.6

Points Assigned for Calculation of GPA

Grade	Points
High Distinction	4
Distinction	3
Credit	2
Pass	1

The points obtained by a student were then summed and averaged by the number of subjects completed by a student.

$$\text{GPA} \quad \frac{\text{sum of subject grade points}}{\text{total no. of subjects}}$$

Weighted Average Mark

Subjects were weighted according to their curriculum credit points and used to derive a Weighted Average Mark (WAM). The points for subjects were allocated as shown in Figure 3.7.

Figure 3.7

Points Assigned for Subjects Studied

Subject	Points
SCIE110	6
NURS121	16
NURS122	8
NURS123	6
NURS124	6
SCIE111	6

Marks for a subject were multiplied by the appropriate points. All derived scores were then summed and divided by the sum of the total subject points obtained by a student.

$$\text{WAM} = \frac{\text{sum of (marks multiplied by appropriate points)}}{\text{sum of subject points}}$$

3.7.3 Attitudes to Nursing (AN)

An attitudes to nursing score was obtained by summing the strength score for the individual items to get a total strength score and divided by the number of items to get a mean strength score of students' attitudes to nursing. A mean score of five, for example, would indicate strong attitudes to nursing whilst a mean score of one, for example, would indicate weak attitudes to nursing.

3.7.4 Gender Characteristics (BSRI)

Masculinity and Femininity scores were obtained by summing the responses to the appropriate twenty items and dividing by the number of items.

The profile similarity indices devised by Motowildo (1981, p738) was then employed to further sub-divide the scores and derive the four prototype profiles (7:1 masculine; 1:7 feminine; 1:1 undifferentiated; 7:7 androgynous). This procedure is outlined as:

Feminine Profile: $FP=72-((M-1)^2+(F-7)^2)$

Masculine Profile: $MP=72-((M-7)^2+(F-1)^2)$

Undifferentiated Profile: $UP=72((M-1)^2+F-1)^2)$

Androgynous Profile:$AP=72((M-7)^2+(F-7)^2)$

(Motowildo 1981, p738)

3.7.5 Self-Efficacy

Scoring for the self-efficacy tools was based on the method used by Betz and Hackett (1983) and other researchers (Lent, Brown & Larkin, 1984; 1986; 1987; Phillips & Russell, 1994; Harvey & McMurray, 1994). This method involves summing the strength score for the individual items on the tool to get a total strength score and then dividing by the number of items to get a mean strength score for the tool.

The mean strength scores for the, SS, SEFFYS and SECC were calculated by this method. The specific calculation of the SS is given in the following sub-section.

SS Science Items

Scores for the subsections Masculine Science (MS), Feminine Science (FS), Mathematics Science (MAS), Neutral Science (NS), and overall Science Score a measure of a student's self-efficacy for science (SS) were obtained. The individual scores for MS, FS, NS and MAS were calculated by summing the responses to appropriate items and dividing by the number of items involved (Appendix 4).

The SS was obtained by summing the scores for the MS, FS, NS and MAS dividing by the total number of science items (21).

A mean score of five, for example indicates strong self-efficacy for science, whilst a low score indicates low self-efficacy for science.

3.8 Some Validity Estimates

3.8.1 Introduction

There are various types of validity with each having a different purpose and relevance to different tests (Drummond, 1988, p16). These different types of validity however, are not mutually exclusive of each other (Kaplan & Succuzzo, 1993). In this section, the face (content) validity of the AN and the SS and its sub-sections are discussed. The reliability of the BSRI is outlined including the reliability estimates for this study.

As the AN and SS were developed to predict academic performance in nursing and science respectively, the predictive (criterion-related) validity was also investigated through the research hypotheses and various statistical methods. These results are presented in Chapter Four and the reliability and predictive validity of the AN and SS are discussed in Chapter Five.

3.8.2 Face Validity of AN and SS

Face (content) validity gives an indication that a test measures "the objectives they are purported to measure" (Drummond, 1988, p13). Expert judgement is used in the determination of face validity (Drummond, 1988, p13). Hence the face validity of the AN and SS were verified by the experts in the appropriate fields. The AN was examined by nursing experts involved in the teaching of NURS121 to determine the appropriateness of the items for nursing students. Nine items were selected.

The face validity of the SS was verified by experts involved in teaching physics, chemistry or human bioscience to nursing students. One expert was also a nurse. The SS was reduced from twenty five to twenty one items and minor changes were made to the wording of a few items. The science tasks were considered appropriate for nursing students.

A case study was conducted (see section 3.6.2) and no difficulties were identified with the tools. They were considered valid for the measurement of the nursing attitudes and science self-expectations of undergraduate nursing students.

Statistical investigations of the AN and SS were performed and these results are given in section 4.5.2 and 4.7.1 respectively. Predictive (criterion-related) validity of the AN and SS are discussed in Chapter Five.

3.8.3 Reliability of the BSRI

Bem (1974, p160) reported test-retest reliability for the BSRI Masculinity section as r=0.90 and the Femininity section as r=0.90. She assessed the internal consistency of the BSRI, by calculating the coefficient alpha for each section of the BSRI. For two samples of students, coefficient alphas were reported as: Masculinity 0.86 and 0.86; and Femininity 0.80 and 0.82 (Bem, 1974, 159). Thus the BSRI was found to demonstrate satisfactory internal reliability.

Cronbach alpha coefficients (Cronbach, 1951) for the Masculinity and Femininity sections of the BSRI were calculated for this study. For the Masculinity section alpha=0.84 and for the Femininity section alpha=0.84 (Table 4.12), demonstrating internal consistency in accordance with that found by Bem (1974).

3.9 Summary

The methodology used in this study has been outlined. The variables for investigation were grouped into categories: demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy. The research hypotheses were designed to examine these variables in relation to academic performance.

A student cohort of first year undergraduate nursing students at the University of Wollongong participated in the study. The research instrument incorporated various research tools including the AN, BSRI, Attitudes to Feminism, SEFFYS, SECC and the SS. The AN, and the SS were researcher-developed tools. Students' consent for collection of their academic marks/grades was sought, with ethics-approval.

Students were surveyed by questionnaire in the second session of their course. Of the cohort 94% completed the questionnaire and consent was obtained from 77% for the collection of their academic marks/grades.

Various statistical techniques were used in the analysis of the data. These included: Spearman Rank-Order Correlation, Chi-Square test, Analysis of Variance, Kruskal-Wallis test, Principal Component Factor Analysis, t-test and Wilcoxon signed-ranks test. The internal reliability of the BSRI, as measured by Cronbach alpha, was found to be satisfactory.

The results for the statistical analysis of the data are presented in Chapter Four.

CHAPTER FOUR

RESULTS

CHAPTER 4: RESULTS

4.1 Introduction

In this Chapter, the results for the study of the non-academic factors that influence the success of students in the first year of an undergraduate nursing course are presented.

The Chapter begins with a review of several measures of students' academic performance, the dependent variables in this study. Included in this section are: descriptive statistics for the measures of academic performance, a discussion of students' academic performance in first year subjects, and an examination of the relationship between TER score and academic performance.

The research hypotheses described in sections 1.5 and 3.3 are grouped into the categories of non-academic factors: demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy. Summary statistics for the variables in each category are presented along with the results for the statistical analysis of each of the research hypotheses. In looking at the relationship of various factors with academic performance, students' overall academic performance is measured using GPA, AM and WAM.

Lastly, the results that are statistically significant are summarized.

4.2 Academic Performance

4.2.1 Introduction

In this section, the academic performance of students in the first year of an undergraduate nursing course is examined. Summary statistics for these overall measures of students' academic performance are presented: AM, WAM and GPA. The relationship between students' academic performance in their first year subjects is analysed. Finally, the relationship between TER and students' academic performance in their first year subjects is also analysed.

4.2.2 Measures of Academic performance

Nursing students' academic performance was measured by the marks (score) and grades obtained for all their first year subjects and the derived measures: AM, WAM and GPA. The calculation of AM, WAM and GPA was discussed in Section 3.7.2. In Table 4.1 summary statistics for these measures of academic performance are shown. There is very little difference between the statistics for the AM and WAM. Spearman Correlation of WAM with AM confirmed, that indeed, they were highly correlated ($r=0.99$; $p=0.0001$).

4.2.3 Academic Performance in First Year Subjects

Summary statistics for all the first year subjects of the undergraduate nursing course are shown in Table 4.1. Using these statistics, it can be stated that NURS122(1) and (A) have the lowest means and highest SDs of all the first year subjects for the appropriate session. On the other hand, NURS121(1) and (A) have the highest mean and median score for the appropriate session.

Table 4.1

Summary Statistics for Academic Performance and TER Score

		Academic Score			
Subject	N	Mean	SD	Median	
SCIE110	64	69.01	9.40	68.00	
NURS121(1)	66	74.73	9.21	72.50	
NURS121(A)	66	70.54	15.53	73.50	
NURS122(1)	65	56.37	11.78	58.00	
NURS122(A)	65	56.17	21.67	64.00	
NURS123	64	66.58	6.46	66.50	
NURS124	64	58.03	17.90	62.50	
SCIE111	62	66.03	17.00	69.50	
			Derived Academic Measures		
				Min	Max
AM	66	67.79	7.54	45.00	80.40
WAM	66	67.84	7.64	44.70	81.00
GPA	66	1.82	0.63	0.50	3.20
				TER Score	
Cohort	61	64.43	11.02	36.50	88.00
Males	9	59.60	11.60	48.00	88.00
Females	52	65.26	10.80	36.50	88.00

Spearman Correlation analysis between students' academic score for their first year subjects is shown in Table 4.2. Not all students who gave consent for the collection of their results were enrolled in all the first year subjects offered for the course. Hence the number of observations on which each correlation coefficient is calculated varies slightly.

Table 4.2

Spearman Correlation Between Students' Academic/TER Scores and First Year Subjects

	First Session Subjects				Second Session Subjects				
Subject	SCIE110	NURS121(1)	NURS122(1)	NURS123	SCIE111	NURS121(A)	NURS122(A)	NURS124	TER Score
First Session									
SCIE110 n = 64									
NURS121(1) n = 66	0.25*								
NURS122(1) n = 64	0.32*	0.15							
NURS123 n = 64	0.52***	0.24*	0.47***						
Second Session									
SCIE111 n = 60	0.73***	0.22	0.50***	0.52***					
NURS121(A) n = 64	0.48***	0.76***	0.15	0.53***	0.51***				
NURS122(A) n = 60	0.41**	0.23	0.76***	0.39**	0.51***	0.42***			
NURS124 n = 58	0.63***	0.41**	0.32**	0.43***	0.48***	0.62***	0.43***		
TER n = 53	0.12	0.04	0.15	0.27	0.14	0.12	0.01	0.07	

Statistical Significance *** p = 0.0001 - 0.0009, ** p = 0.001, * p = 0.01 - 0.05

For the first session subjects, SCIE110 correlated more strongly with NURS123 (r=0.52, p=0.0001) than NURS121(1) (r=0.25, p=0.05) or NURS122(1) (r=0.32, p=0.01). SCIE110 also correlated highly with the second session science subject SCIE111 (r=0.64, p=0.0001). Whilst students' academic marks for NURS121(1) and NURS122(1) did not correlate with each other in the first session (r=0.15, p=0.24), they did in the second session (r=0.42, p=0.0008). Attention is drawn to the fact that these are annual subjects and the "official" grades are only awarded at the end of the second session.

In the second session, stronger correlations are found between students' academic scores for all their first year subjects. This may be due to the attrition of academically unsuccessful students from the course in the first session, as nine students left before the commencement of the second session. A Principal Component Factor Analysis of students' academic score for all first year subjects was computed with one factor emerging explaining 57% (that is, 3.43/6 x100) of the total variance of the subjects. This factor included all first year subjects, with the exception of first session NURS121(1) and NURS122(1) which were not included in the analysis, reflecting a factor of overall academic performance. The final communality estimates are shown in Table 4.3. The communality estimate for NURS122(A) is well below those for the other subjects suggesting that students' performance in this subject is less related to overall academic performance.

4.2.4 TER Score and Academic Performance

Students' mean TER score was 64.43 with males having a lower mean score than females (Table 4.1). The Spearman Correlation Coefficients in Table 4.2 show that students' TER score is not correlated with academic performance in any of the first year subjects scores in the undergraduate nursing course. The subject that comes closest to having a statistically significant correlation with the TER score is NURS123 (r=0.27, p=0.06).

Table 4.3

Principal Component Factor Analysis of Subject Scores

Subject	Communality Estimates
NURS122(A)	0.37
NURS121(A)	0.52
NURS123	0.56
SCIE111	0.63
NURS124	0.66
SCIE110	0.69
TOTAL	3.43

4.3 Demographic Data

4.3.1 Introduction

A summary of the demographic data of the student cohort is given in Appendix 5. Of the students in the study all but one are full-time, 85% are single, 70% gained entry on the basis of their HSC/TER score and their mean age is 21.5 years. A higher proportion of females are married and gained admission via the "mature-age/other" entry category than male students.

Male students have a lower average age than their female counterparts, are more likely to be single and gain admission on the basis of HSC/TER. For the cohort, 85% of students are born in Aust/UK/NZ and 95% speak English at home.

4.3.2 Results: Hypothesis (1)

Males and females have different self-efficacy strengths for science.

Whilst females' mean SS was lower than males (Table 4.16), t-test analysis demonstrated that this difference was not statistically significant (p=0.54).

Result: hypothesis rejected.

4.3.3 Results: Hypothesis (2)

Students with parents born overseas (excluding UK/NZ) perform better in first year subjects than students with parents born in Australia/UK/NZ.

As most students were born in Aust/NZ/UK and usually speak English at home, it was decided not to analyse the effects of these particular variables. However, as 13% of students' mothers and 19% of students' fathers were born in countries other than Aust/UK/NZ it was decided to examine this variable to gauge any ethnicity effect. For the students in the study, who gave permission for collection of academic results, no Aust/UK/NZ born mothers were married to males born in "other" countries. Hence it was decided to use the birthplace of a students' father as the variable for analysis in this hypothesis.

Whilst there is a difference in the means of GPA and WAM (Table 4.4), with students' fathers born overseas (excluding UK/NZ) performing below that of students with fathers' born in Aust/UK/NZ (contrary to hypothesis expectations), the t-test results are not statistically significant. Nevertheless the result is close to significance (p=0.08) and with a larger sample it may be statistically significant.

Result: hypothesis rejected.

Table 4.4

Effect of Demographic Data on Academic Performance

Variable	N	Mean	SD	T-Test p	Wilcoxon p
Fathers' Birthplace			GPA		P
Aust/NZ/UK	51	1.85	0.60		
Other	12	1.55	0.69	0.14	0.31
			WAM		
Aust/NZ/UK	51	68.24	6.87		
Other	12	64.00	9.55	0.08	0.21
Mode of Entry			GPA		
HSC	50	1.80	0.59		
MAE/Other	16	1.91	0.77	0.55	0.47
			WAM		
HSC	50	67.73	7.35		
MAE/Other	16	68.22	8.75	0.83	0.62
Marital Status			GPA		
Single	57	1.80	0.63		
Married/De facto	8	2.04	0.69	0.30	0.30
			WAM		
Single	57	67.45	7.70		
Married/De facto	8	70.72	7.56	0.26	0.26

4.3.4 Results: Hypothesis (3)

A student's age is related to academic performance.

After examining the age distribution of the cohort it was decided to divide students into three age groups: 17-19, 20-24 and 25 years and above. An analysis of variance (ANOVA) demonstrated that there was no statistical significant difference between age groups in terms of GPA (p=0.17) or WAM (p=0.15) (Table 4.5). The Kruskal-Wallis test showed similar results (GPA, p=0.18; WAM, p=0.15). In addition Spearman-Rank Order Correlation confirmed that age was not correlated with GPA or WAM (Table 4.5).

Result: hypothesis rejected.

Table 4.5

Age and Academic Performance

Results of Analysis of Variance		
	F	p
GPA	1.81	0.17
WAM	1.94	0.15
Spearman Correlation		
		p
GPA	0.16	0.20
WAM	0.19	0.12
n-66		

4.3.5 Results: Hypothesis (4)

Students with "mature-age/other entry" to the course perform better academically than school leavers.

For the study 24.2% of students were admitted via the "mature-age/other" category (Table 4.4). These students obtained a higher mean GPA and WAM than those admitted on the basis of HSC/TER score. However, in Table 4.4 it can be seen that these differences are not statistically significant using the t-test ($p=0.55$; $p=0.83$). Wilcoxon analysis gave the same conclusions ($p=0.47$; $p=0.62$).

Result: hypothesis rejected.

4.3.6 Results: Hypothesis (5)

A student's marital status is related to academic performance.

Whilst the mean WAM and GPA for married/defacto students was higher than that for single students, the difference was not statistically significant (Table 4.4). Wilcoxon analysis confirmed the t-test results ($p=0.26$).

Result: hypothesis rejected.

4.3.7 Summary

Demographic data pertaining to students' ethnicity, age, marital status and "mature-age/other" entry to the course were not statistically significantly related to overall academic performance. However, students' ethnicity as defined by a fathers' birthplace, came close to reaching statistical significance. There were no statistically significant gender differences in self-efficacy strengths for science.

4.4 Social Characteristics

4.4.1 Introduction

A summary of the statistics for social characteristics is given in Table 4.6 and Appendix 6. Students are most likely to have attended a co-educational (Co-Ed) school (81%) which is administered by the state/public (65%). They rely on part-time/casual work, parents/guardians and Austudy/Abstudy, in that order, for financial support whilst they are at university.

Many female students (18%) have mothers who are nurses (Appendix 6). However, only 2 students (1 male and 1 female) had fathers who are nurses. When occupational categories are divided into high, medium, low and not employed more students' fathers appear to come from the high occupational categories. Many mothers are engaged in "home duties" (28%), hence the category "not employed" contains more persons than the similar category for fathers. Whilst similar percentages of students' mothers and fathers have a degree qualification (fathers 27.3%; mothers 26.9%), more mothers have only had a secondary education or less (59%; Table 4.6).

The social characteristics of male students differ from those of female students (Appendix 6). Male students are less likely than female students to have mothers who are nurses. Mothers of male students, are twice as likely as fathers to have a degree qualification. In addition, fathers of male students are more likely than the cohort to come from the low and not employed SES occupational category (54%; Table 4.6).

Table 4.6

Parents' Education and Occupation

Variable	Mother %		Father %	
	Cohort	Males	Cohort	Males
Level of Education				
Degree	27	55	27	27
Trade Qualification/ Certificate/Diploma	14	0	38	46
Secondary School	23	18	12	0
Did not Complete Secondary School	36	27	23	27
Occupation				
High[1]	20	18	39	18
Medium[2]	31	27	29	27
Low[3]	13	18	20	37
Not Employed[4]	36	37	12	18

1 Categories 1 & 2 (see Figure 3.4)
2 Categories 3, 4, 5 & 12
3 Categories 6, 7 & 8
4 Categories 9, 10, 13-16

4.4.2 Results: Hypothesis (6)

Students from lower socio-economic background perform better academically than students from higher socio-economic backgrounds.

It was decided to examine the relationship between the three indices of SES, school type, parent occupation and education and overall academic performance separately.

Students from private schools, one indicator of a higher SES, had a lower GPA and WAM than students from state/public schools. T-Test results shown in Table 4.8 demonstrate that this difference was not statistically significant (GPA p=0.36, WAM p=0.45). These result were confirmed by Wilcoxon analysis (Table 4.8).

For parental education, analysis of variance found no statistically significant difference in students' GPA or WAM (Table 4.7). The Kruskal-Wallis test showed similar results.

For statistical analysis, students' fathers occupation were divided into four groups incorporating the various occupational categories. These were: high (1,2), medium (3, 4, 5, 12), low (6-8) and not employed (9-11, 13-16). An analysis of variance found no statistically significant difference between these groups for students' GPA or WAM (Table 4.7). As 28% of mothers were in category 9 (home-duties) it was decided to form an additional occupational SES group for mothers. An analysis of variance shown in Table 4.7 demonstrates that a mothers' occupational SES did influence students' GPA (p=0.05) and WAM (p=0.05). Students with mothers in the "low" socio-economic group obtained lower mean GPA and WAM than those from the "middle" or "not-working" groups.

Result: hypothesis partially accepted. Hypothesis accepted for mother's occupation and students' academic performance. Hypothesis rejected for type of schooling, parents' educational background and fathers' occupation.

4.4.3 Results: Hypothesis (7)

Females from single sex-schools have a higher self-efficacy for science than females from co-educational schools.

For the cohort, 57 (82.6%) female students attended co-educational (Co-Ed) schools and 12 (17.4%) attended single-sex schools. The mean SS demonstrates that female students from single-sex schools have a lower self-efficacy for science than those from Co-Ed schools (Table 4.8). However, this difference was not statistically significant for the t-test (p=0.84) or the Wilcoxon test (p=0.81)

Result: hypothesis rejected.

Table 4.7

Socio-Economic Background of Parents and Students' Academic Performance

Summary of Results of Analysis of Variance			
Variable	DF	F	p
		GPA	
Fathers' Occupation[1]	3	0.65	0.59
Mothers' Occupation[2]	4	2.45	0.05*
Fathers' Education	3	0.45	0.72
Mothers' Education	3	0.54	0.65
		WAM	
Fathers' Occupation[3]	3	0.65	0.59
Mothers' Occupation[4]	4	2.48	0.05*
Fathers' Education	3	0.46	0.71
Mothers' Education	3	0.42	0.74

* Statistically significant
[1] n = 63
[2] n = 65
[3&4] n = 66

Table 4.8

SS , Academic Performance and Type of Schooling

Variable	N	Mean	SD	T-Test p	Wilcoxon p
Co-Ed School			SS		
Yes	57	4.03	0.52		
No (Girls' School)	12	3.99	0.85	0.84	0.81
Type of Secondary School			GPA		
State/Public	39	1.88	0.65		
Private	26	1.73	0.61	0.36	0.25
Type of Secondary School			WAM		
State/Public	39	68.42	8.20		
Private	26	66.92	6.94	0.45	0.27

4.4.4 Summary

Of the social characteristics examined in this study, only mothers' occupation was related to the academic performance of students. Neither fathers' occupation nor the other two SES indices (parents' level of education and attendance at a private school) were related to students' academic performance.

Female students' self-efficacy for science was not influenced by attendance at a single-sex or co-educational school.

4.5 Vocational Choice

4.5.1 Introduction

A summary of the statistics for vocational choice are presented in Appendix 7. The statistics for the AN are given in the following sub-section.

The three main reasons for choosing nursing can be ranked as: personal satisfaction (32%), to care for others (27%) and to establish a good career (22%). The ranking of the first and third reasons for choosing nursing are the same for both genders. For males, however, "TER score insufficient for other courses" was the second most popular reason for choosing a nursing course. Interestingly, no males chose the option "to care for others", a response which was previously identified as a popular response for females.

A nursing course was a first preference for 72% of students and, 42% made the decision to nurse in the previous year, whilst the remaining 58% made the decision from one to more than five years ago (Appendix 7).

4.5.2 Attitudes to Nursing (AN)

The summary statistics for the AN are given in Table 4.9. Summary statistics for individual AN items, by gender, are given in Appendix 8.

Table 4.9

AN Summary Statistics

Statistics	Cohort n = 81	Female n = 70	Male n = 11
Mean	4.32	4.34	4.24
SD	0.37	0.38	0.31
Median	4.33	4.37	4.28
Cronbach α	0.67		
T-Test by Gender p	0.40		

The SD for the AN is low indicating that nursing students are a relatively homogeneous group of students. The results also indicate that the AN has tapped into attitudes that apply to nursing students. The item "relatives of patients are: demanding/need reassuring" had the lowest mean and highest SD for the tool. It was surprising to find that some students scored "nursing is interesting" as a 1 (sometimes), as one would expect students in a nursing course to have a strong interest in nursing. Nursing students were strong in their agreement that "nursing involves team work" which had the highest mean (4.86, Appendix 8). This was followed closely by "helping a patient recover from an illness" (4.84, Appendix 8). The AN was not gender-biased as indicated by the t-test results (Table 4.9).

4.5.3 Results: Hypothesis (8)

Students who choose the course as a first preference perform better academically in NURS121 than those for whom it was not a first choice.

A table of nursing as a first preference and students' academic grades for NURS121(A) is given in Appendix 13. This shows that students for whom nursing was not a first choice, were less likely to get a distinction or high distinction, than those for whom nursing was a first choice. Students who chose nursing as a first preference (Q22) achieved a higher mean score (73.70) than those for whom it was not a first choice (70.23). The results in Table 4.10 show that the difference between the groups was statistically non-significant for the t-test (p=0.17) but significant on the Wilcoxon test (p=0.04).

Result: hypothesis accepted.

Table 4.10

Nursing as First Preference and Academic Scores for NURS121(A)

Nursing as First Preference	N	Mean	SD	T-Test p	Wilcoxon p
Yes	47	73.70	9.72		
No	17	70.23	6.20	0.17	0.04

4.5.4 Results: Hypothesis (9)

That students' reasons for choosing nursing are related to their attitudes to nursing.

Students had eight options for Question 21 (major reason for choosing a nursing course), which gave too few students in some groups to reliably analyse (see Appendix 7).

It was decided for analysis purposes, to reduce these to three groups. The first and second main choices that is, personal satisfaction and to care for others, were retained as two groups with the remainder of the options making the third group. An analysis of variance (Table 4.11) showed that there were no statistically significant differences in AN according to the students' reason for choosing nursing (p=0.10).

Result: hypothesis rejected.

Table 4.11

AN and Reason for Choosing Nursing (Q21)

Results of Analysis of Variance			
AN	DF	F	p
Q21	2	2.41	0.10

4.5.5 Results: Hypothesis (10)

That students' attitudes to nursing are related to academic performance in NURS121.

A student's attitudes to nursing (AN) is correlated with a student's academic score for first session NURS121(1) and NURS121(A) (r=0.26, p=0.04). These results are given in Table 4.18.

Result: hypothesis accepted.

4.5.6 Summary

Students who chose nursing as a first preference perform better academically in NURS121(A) than those for whom it was not a first choice.

Students' reasons for choosing nursing and their attitudes to nursing are not related. However, it should be noted that the results were at the alpha 0.1 level, indicating that with a larger cohort a relationship between nursing as a vocational choice and attitudes to nursing might be found.

Students' attitudes to nursing are related to academic performance in NURS121.

4.6 Gender Characteristics

4.6.1 Introduction

In Table 4.12 the summary statistics for the BSRI Masculinity and Femininity scores and those for the Profile similarity indices are given (see section 3.7.4 for their derivation).

Students' BSRI Masculinity and Femininity scores are higher and lower for the appropriate gender. The highest mean and median profile similarity score was for the androgyny profile (AP), hence the cohort was overwhelmingly androgynous in their gender identity.

For the other profiles, males are more likely to fit the masculinity prototype profile (MP) than females who, not surprisingly, have a higher mean and median score for the feminine profile (FP).

Table 4.12

BSRI Summary Statistics

	BSRI Scores			Profile Similarity Scores		
Statistics	M	F	AP	UP	MP	FP
Mean						
Cohort n = 81	5.02	5.05	63.34	38.54	50.77	51.15
Female n = 70	4.97	5.12	63.45	38.33	50.04	51.74
Male n = 11	5.30	4.63	26.97	39.84	55.44	48.37
SD						
Cohort	0.67	0.67	3.93	7.48	6.44	5.80
Female	0.69	0.67	4.16	7.96	6.22	5.62
Male	0.50	0.55	1.98	2.90	6.10	5.76
Median						
Cohort	5.15	5.05	64.17	38.59	51.89	51.38
Female	5.12	5.12	64.39	38.09	50.73	51.54
Male	5.40	4.70	62.87	39.20	56.60	46.00
Cronbach α	0.84	0.84				

4.6.2 Results: Hypothesis (11)

Students' BSRI Masculinity scores are related to self-efficacy for science.

Students' BSRI Masculinity scores are related to self-efficacy for science, that is, SS (r=0.24, p=0.03) and NS (r=0.23; p=0.04) and MS (r=0.23; p=0.04) subsections of the SS as shown in Table 4.13. The correlation coefficients for the BSRI and SS by gender, are given in Appendix 9.

Result: hypothesis accepted.

Table 4.13

Spearman Correlation between SS and BSRI Masculinity and Femininity Scores

		SS Sub-Sections			
BSRI Scores	SS	NS	MS	FS	MAS
Masculinity n = 81	0.24*	0.23*	0.23*	0.10	0.15
Femininity n = 81	0.00	0.01	0.11	0.07	-0.08
Females' Masculinity n = 70	0.19	0.20	0.19	0.09	0.08
Females' Femininity n = 70	0.11	0.09	0.23*	0.05	0.01
Males' Masculinity n = 11	0.39	0.49	0.20	0.23	0.39
Males' Femininity n = 11	-0.11	-0.46	-0.29	0.09	0.35

* Statistical Significance $p = < 0.05$

4.6.3 Results: Hypothesis (12)

Students' BSRI Masculinity scores are related to self-efficacy for SCIE111 and NURS124.

Students' BSRI Masculinity scores were found to be significantly correlated with self-efficacy for SCIE111(r=0.42; p=0.0001) and NURS124 (r=0.24; p=0.05) as shown in Table 4.14.

Result: hypothesis accepted.

4.6.4 Results: Hypothesis (13)

A student's BSRI Masculinity score is related to academic score for SCIE110, SCIE111 and NURS124 ("masculine-typed" subjects).

The Spearman Rank-Order Correlation between students' BSRI Masculinity score and academic score for SCIE110, SCIE111 and NURS124 are shown in Table 4.14. A student's BSRI Masculinity score is not statistically correlated with students' academic scores for SCIE111, SCIE110 or NURS124.

Result: hypothesis rejected.

4.6.5 Results: Hypothesis (14)

Students with a high BSRI Femininity score achieve lower academic scores in SCIE110, SCIE111 and NURS124.

In Table 4.14 it can be seen that BSRI Femininity scores are only correlated with academic performance in SCIE111 ($r=0.27$, $p=0.03$) for all students. For females only, this relationship is stronger ($r=0.32$, $p=0.02$). So, contrary to expectations, a high Femininity score is related to a high academic score for SCIE111.

Femininity scores were not related to academic performance in SCIE110 or NURS124.

Result: hypothesis rejected.

4.6.6 Results: Hypothesis (15)

Students' BSRI Femininity scores are related to self-efficacy for NURS121.

For the cohort BSRI Femininity score is not correlated to self-efficacy for NURS121 (r=0.17, p=0.12, Table 4.14). For females only, whilst there is a stronger relationship, it just fails to reach statistical significance (r=0.23, p=0.06).

Result: hypothesis rejected.

Table 4.14

Spearman Correlation Between Masculinity, Femininity, SEFFYS and Academic Scores

	Masculinity		Femininity	
	Cohort	Females	Cohort	Females
SEFFYS				
SCIE111 n = Cohort 81, F 67	0.24*	0.23	-0.07	-0.00
NURS124 n = Cohort 78, F 70	0.42***	0.38***	0.05	0.16
NURS121 n = Cohort 66, F 70	–	–	0.18	0.23
Academic Score				
SCIE110 n = Cohort 65, F 55	0.06	-0.03	0.11	0.20
SCIE111 n = Cohort 60, F 32	0.18	0.17	0.27*	0.32**
NURS124 n = Cohort 60, F 51	0.14	0.09	0.06	-0.007

Statistical Significance
*** p = 0.0001
** p = 0.001
* p = < 0.05

4.6.7 Results Hypothesis (16)

For female students, a positive attitude to feminism is related to BSRI Masculinity score .

There was no statistical difference between the BSRI Masculinity scores for those responding yes to Q86 (Would you call yourself a feminist?) or Q87 (Do you use the title Ms?) as shown in Table 4.15. Hence, no further analysis was performed.

Result hypothesis rejected.

Table 4.15

BSRI Masculinity Score and Attitudes to Feminism

		Masculinity Score		
Variable	N	Mean	SD	T-Test: p
Call Self Feminist (Q86)				
Yes	21	4.97	0.68	
No	47	4.96	0.70	0.94
Use Title Ms (Q87)				
Yes	16	5.01	0.51	
No	53	4.96	0.74	0.79

4.6.8 Summary

Students' BSRI Masculinity scores were related to their self-efficacy for science.

Whilst Masculinity scores were also related to a student's self-efficacy for the first year subjects SCIE111 and NURS124, they were not related to academic performance. Neither were Masculinity scores related to a positive attitude to feminism.

Femininity scores were not correlated with self-efficacy for NURS121, although the correlation was close to reaching statistical significance. Students' Femininity scores were not statistically significantly related to lower academic grades in SCIE110 or NURS124. In fact, contrary to hypothesis expectations, Femininity scores were statistically significantly related to higher academic scores in SCIE111 for the students in the study and females only.

4.7 Self-Efficacy

4.7.1 Introduction

The summary statistics for the SS are presented in Table 4.16.

Table 4.16

SS Summary Statistics

		SS Sub-Sections			
Statistics	SS	NS	FS	MS	MAS
Mean					
Cohort n = 81	4.03	4.34	4.42	3.87	3.51
Female n = 70	4.01	4.44	4.48	3.83	3.44
Male n = 11	4.16	4.45	4.07	4.14	3.94
SD					
Cohort	0.63	0.63	0.66	0.79	0.91
Female	0.59	0.60	0.59	0.79	0.87
Male	0.89	0.81	0.95	0.90	1.13
Median					
Cohort	4.19	4.60	4.60	3.80	3.50
Female	4.14	4.60	4.70	3.80	3.50
Male	4.71	4.80	4.60	3.80	4.50
Cronbach α	0.90	0.69	0.71	0.73	0.73
T-Test by Gender p	0.54	0.93	0.06	0.22	0.09

A Spearman correlational analysis was performed to assess the relationship between the SS and its sub-sections. The results are presented in Table 4.17.

All results were statistically significant at the p=0.0001 level. Importantly the science score, a measure of a student's self-efficacy for science (SS), correlated highly (r=0.73-0.86) with the science sub-sections.

Table 4.17

Spearman Correlation Coefficients for SS and Sub-Sections

	SS	NS	MS	FS	MAS
SS					
NS	0.82				
MS	0.85	0.66			
FS	0.73	0.65	0.64		
MAS	0.86	0.60	0.56	0.44	

All results statistically significant p=0.0001

The SS was devised to determine a student's self-efficacy strength for science, again with the purpose of predicting academic performance in first year science subjects in an undergraduate nursing course. Results (Table 4.18) indicate that SS is indeed correlated statistically significantly with academic performance in SCIE110 (r=0.49, p=0.0001) and SCIE111 (r=0.43, p=0.0005).

In addition, the SS was found to have a slightly stronger correlation with students' academic performance in first session NURS121(1) (r=0.28, p=0.02) than the AN (r=0.26, p=0.04). However, this does not apply for the second session and overall score, where the AN is more strongly and statistically significantly correlated with NURS121(A) (r=0.26,p=0.04) than the SS (r=0.21, p=0.10) (Table 4.18).

As shown in Table 4.18, the SS is statistically significantly correlated with academic performance as measured by the WAM (r=0.29, p=0.02) and AM (r=0.32, p=0.01) and GPA (r=0.33, p=0.007).

In fact, as demonstrated clearly in Table 4.18, the correlations between the SS and students' academic performance in the first year subjects, with the exception of two subjects, is much stronger than students' TER score which is not statistically significantly correlated to any subject. The exceptions are NURS122(1) and NURS123, although the relationship with TER is non-significant for these subjects. Correlation coefficients for students' subject scores/overall academic performance and the SS by gender are given in Appendix 10.

4.7.2 Results: Hypothesis (17)

A student's self-efficacy for science is related to academic performance in science-based first year subjects (SCIE110, SCIE111).

A student's self-efficacy for science, as measured by the SS is correlated with a student's academic score for SCIE110 (r=0.49, p=0.0001) and SCIE111 (r=0.33, p=0.009). These results are shown in Table 4.18

Result: hypothesis accepted.

4.7.3 Results: Hypothesis (18)

Students with better grades in HSC science subjects also have higher self-efficacy for science.

In Appendix 11 the HSC science/mathematics background of students is shown. For the cohort, 35 students had not studied any science for their HSC. Whilst their mean score was below that of those who did do science (chemistry, physics, biology or general science) in their HSC, this difference, although close, was not statistically significant (p=0.09, Table 4.19).

Results: hypothesis rejected.

Table 4.18

Spearman Correlation between Academic Score in First Year Subjects with the AN, SS and TER Score

Subject	AN	SS	TER Score	
First Session				
SCIE110	0.20	0.49	0.12	
n = 64	0.11	0.0001*	0.39	
				n=53
NURS121(1)	0.26	0.28	0.04	
n = 66	0.04*	0.02*	0.78	
				n = 52
NURS122(1)	-0.04	0.09	0.15	
n = 65	0.77	0.47	0.27	
				n = 53
NURS123	0.06	0.24	0.27	
n = 64	0.64	0.06	0.06	
				n = 48
Second Session				
SCIE111	0.14	0.43	0.14	
n = 60	0.28	0.0005*	0.34	
				n = 51
NURS121(A)	0.26	0.21	0.12	
n = 64	0.04*	0.10	0.41	
				n = 49
NURS122(A)	-0.10	0.03	0.01	
n = 65	0.44	0.80	0.95	
				n = 51
NURS124	0.09	0.13	0.07	
n = 60	0.50	0.32	0.63	
				n = 48
Academic Performance Measure				
WAM n = 66	0.13	0.29	0.07	
	0.28	0.02*	0.58	
				n = 53
AM n = 66	0.10	0.32	0.09	
	0.41	0.01*	0.51	
				n = 53
GPA n= 57	0.08	0.33	0.14	
	0.53	0.007*	0.33	
				n= 53

* Statistically significant

Table 4.19

Relationship Between Students' Science Background and SS, and SEFFYS and Academic Subject Score

Variable	N	Mean	SD	T-Test: p	Wilcoxon: p
Science Background		SS		P	P
No HSC Science	35	3.90	0.64		
Did HSC Science	46	4.14	0.61	0.09	0.07
SEFFYS		Academic Score for Subject			
NURS121(A)					
1, 2, 3	25	69.48	8.20		
4, 5	39	74.90	8.96	0.02*	0.007*
NURS122(A)					
1, 2, 3	25	62.24	9.86		
4, 5	34	62.94	11.76	0.81	0.65
NURS124					
1, 2, 3	42	61.40	10.06		
4, 5	18	63.28	8.12	0.49	0.41
SCIE111					
1, 2, 3	39	65.08	12.28		
4, 5	29	74.19	8.61	0.004*	0.001*

* Statistically significant

4.7.4 Results: Hypothesis (19)

Students who have failed SCIE110 have a low self-efficacy for SCIE111.

As no students who gave permission for the collection of their academic results failed SCIE110, analysis of this hypothesis could not proceed.

4.7.5 Results: Hypothesis (20)

The strength of a student's self-efficacy for second (Spring) session subjects is related to academic performance in that subject.

Scores for self-efficacy for first year subjects were divided into two categories: 1, 2 and 3 (low self-efficacy) and 4 and 5 (high self-efficacy). Students who have a higher self-efficacy for NURS121(A) and SCIE111 achieved higher mean scores than those with a lower self-efficacy for the subject. This difference was statistically significant on a t-test procedure (Table 4.19).

Whilst students' achieved higher mean academic scores for NURS122(A) and NURS124 the difference between the low and high self-efficacy categories was not statistically significant.

Result: hypothesis accepted for NURS121(A) and SCIE111 and rejected for NURS122(A) and NURS124.

4.7.6 Results: Hypothesis (21)

Self-efficacy for a subject is related to a student's degree of interest in that subject.

Initially a table with the five responses for self-efficacy for first year subjects and degree of interest in that subject was produced. On the basis of this table it was decided to merge responses 1, 2 and 3 (low) and 4 and 5 (high) to form two categories with sufficient sample numbers for analysis. The results, which are shown in Appendix 12, indicate that students are less confident and less interested in NURS124 and SCIE111. They are also more confident and more interested in NURS121(A) and NURS122(A).

Table 4.20

Chi-Square Statistics for Association of Interest and Self-Efficacy for Second Session Subjects (SEFFYS)

Subject	DF	Value	p
SCIE111	1	24.11	0.000
NURS124	1	25.48	0.000
NURS121	1	16.05	0.000
NURS122	1	8.51	0.004

All statistically significant

The Chi-Square statistics shown in Table 4.20 indicate that students' self-efficacy for first year subjects (SEFFYS) are statistically significantly related to their degree of interest in that subject.

Result: hypothesis accepted.

4.7.7 Results: Hypothesis (22)

Students who chose nursing as a first choice have a strong self-efficacy for course completion.

A table of nursing as a first choice (Q22) by self-efficacy for course completion was computed. Responses to 1, 2 and 3 were merged to give categories with sufficient sample numbers for Chi-Square analysis. Results for the revised table indicate that students who choose nursing as a first choice have a stronger self efficacy for course completion than those for whom it is not a first choice (Table 4.21).

Table 4.21

Chi-Square Table of Nursing as a First Preference (Q22) by Self-Efficacy for Course Completion (Q20)

Nursing as First Preference	1, 2 + 3 %	4 %	5 %	Total %
Yes	29.14 n = 14	29.31 n = 17	46.55 n = 27	100.00 n = 58
No	31.82 n = 7	45.45 n = 10	22.73 n = 5	100.00 n = 22

Statistics for Association between Q22 and Q20

Chi-Square	DF	Value	p
	2	3.85	0.15

However, the results are not statistically significant (p=0.15).

Result: hypothesis rejected.

4.7.8 Summary

Self-Efficacy for Science

The strength of students' self-efficacy for science was correlated with their academic performance in first year science subjects. Students' self-efficacy for science however, was not related to their HSC science background.

Self-Efficacy for First Year Subjects

Although the strength of a student's self-efficacy for second session subjects was related to better academic performance in those subjects, statistical significance was only reached for NURS121(A) and SCIE111. Self-efficacy for a subject was related to their degree of interest in that subject.

Course Completion

Students who chose nursing as a first choice did not have a significantly stronger self-efficacy for course completion.

4.8 Overall Summary of Results

This Chapter began with a review of undergraduate nursing students' academic performance in their first year subjects, the dependent variable in this study. Students' academic performances in first year science subjects were found to be highly correlated with each other. Correlations between students' academic scores in the first year subjects were stronger in the second session. The attrition of academically unsuccessful students in first session subjects is proposed as an explanation. Another explanation is that students, by second session, have adjusted to tertiary education and are achieving their full academic potential.

Each of the hypotheses were analysed and either rejected or accepted on the basis of their results. Demographic data did not appear to be significantly related to academic performance, with hypotheses (1)-(5) being rejected. For social characteristics hypothesis (6) was partially accepted and hypothesis (7) was rejected. Vocational choice hypothesis (8) and (10) were fully accepted and (9) rejected. Gender characteristics hypotheses (11) and (12) were accepted, hypotheses (13-16) were rejected.

Finally, for self-efficacy, hypotheses (17) and (21) were accepted, hypothesis (20) partially accepted and hypotheses (18) and (22) rejected.

Thus, at the significance level of the conventional alpha 0.05 the following factors were found to be statistically significantly related to students' academic performance:

- mothers' occupational SES;
- nursing as a first choice and academic performance in NURS121;
- Femininity scores and academic performance in SCIE111;
- self-efficacy for science (SS) and academic performance in science-based first year subjects (SCIE110, SCIE111);
- attitudes to nursing AN and academic performance in introductory nursing subject NURS121(1)/(A) and
- self-efficacy for first year subjects (SEFFYS) and academic performance in NURS121 and SCIE111.

In addition, the SS was related to academic performance in NURS121(1), GPA, WAM and AM. With the exception of NURS122(1) and NURS123, the SS was more strongly correlated to students' academic performance in first year subjects and overall academic performance than their TER score.

The following factors were found to be statistically significantly (p=<0.05) influencing students' self-efficacy expectations for science, or first year subjects:

- Masculinity scores and self-efficacy for science;
- Masculinity and self-efficacy for first year subjects (SEFFYS) SCIE111 and NURS124;
- self-efficacy for first year subject (SEFFYS) and a student's degree of interest in that subject.

At the significance level p=0.05-0.1 the following were related to self-efficacy and could reach statistical significance with a larger cohort:

- Femininity scores and self-efficacy for NURS121;
- HSC science background and self-efficacy for science (SS);
- nursing as a first choice and self-efficacy for course completion (SECC).

In addition, at the significance level p=0.1 students' attitudes to nursing and their reason for choosing nursing were related.

In the following Chapter, conclusions regarding the study will be discussed. Also, recommendations for future research stimulated by this study will be presented.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, a summary is given and the conclusions and recommendations for the investigation of the non-academic factors that influence students' academic performance in the first year of an undergraduate nursing course are presented.

A summary and conclusions are presented for each of the research categories: demographic data, social characteristics, vocational choice, gender characteristics and self-efficacy. Specific recommendations for each of the research categories are given.

Conclusions about the performance of the AN and SS, the tools developed specifically for the study are presented, including those relating to their reliability and validity as predictors of academic performance in nursing and science respectively in the first year of an undergraduate nursing course.

Finally, a summary of the conclusions and a list of the recommendations arising from the study are given.

5.2 Cohort

Students were surveyed by questionnaire early in their second session. By this time, 9 students (3 males, 6 females) had already left the course, consequently, little is known about their characteristics. By surveying students in the first session, it may be possible to identify characteristics that relate specifically to these students, and develop strategies to reduce their attrition from the course.

With 94% of the students enrolled in the subject NURS121 completing the questionnaire, the response rate can be considered to be excellent. A satisfactory response rate for the collection of grades/marks for the first year undergraduate subjects was obtained, with 77% of the students giving their consent.

Recommendation

Students should be surveyed in the first session of their first year to investigate the characteristics of students leaving the course.

5.3 Academic Performance

5.3.1 Introduction

In this section, conclusions regarding students' academic performance are presented These include those relating to: the overall academic performance measures, students' academic performance in the first year, and the TER score and academic performance. Recommendations for each section are given.

5.3.2 Academic Performance Measures

Academic performance was measured by score (marks) and grades for all first year subjects. Overall academic performance was measured by AM, WAM and GPA. Academic performance was the dependent variable in this study. There was very little difference between the statistics for the AM and WAM, suggesting that the use of only one of these measures, in addition to GPA, may be necessary when assessing overall academic performance.

Recommendation

Future studies should use GPA and either WAM or AM (not both) for measuring students' overall academic performance.

5.3.3 Academic Performance in First Year Subjects

In the first session, the subjects NURS123 and SCIE110 were statistically correlated with each other and NURS121(1) and NURS122(1) (see Table 4.2). However, the fact that NURS121(1) and NURS122(1) were not statistically correlated with each other might be explained by the great difference in their scores, as NURS121(1) had the highest mean score (74.43), and NURS122(1) the lowest mean score for the first session (Table 4.1). The subject NURS121(1)/(A) had the lowest correlation coefficients with other subjects in the appropriate session (Table 4.2). Again students' high mean score may be an explanation. Whilst it could be concluded that it is a subject which students find academically easy, it might also reflect the degree of interest in this subject, which is about nursing practice, and therefore viewed as directly relevant to their career choice.

The reason for students' poor academic performance in NURS122(1)/(A) is uncertain. It has the lowest mean and highest SD (Table 4.1) for the appropriate session and was found to have the lowest communality of all the second session subjects (Table 4.3). A review of the subject is necessary to understand students' difficulties with the subject.

There is a strong relationship between the science-based subjects (SCIE110 and SCIE111; Table 4.2) in the first year. Student's academic performance in SCIE110 will be a source of efficacy information about their ability to succeed in the science areas of the curriculum. Thus students' performance attainments will serve to raise or lower their expectations in regard to academic performance in SCIE111 (see Figure 2.1).

By early identification, measures may be taken to assist students with low self-efficacy to increase their self-efficacy and overcome their expectations for success in science. This may help to increase their academic performance, enhancing their performance attainments in future science subjects in the nursing course. It may also help to decrease the number of students failing science subjects, and reduce the attrition of students from the course.

There was also a strong relationship between the science-based subjects and research methods (NURS124), that is, between the masculine areas of the curriculum.

It appears that students' withdrawal from the course in the first year may be linked to academic performance, with students having academic difficulties leaving the course before the second session. This is reflected in the stronger correlations between student's scores in the second session of their first year. It may however, indicate that a "settling-in" period occurs in first session, and by second session students are achieving their full academic potential.

Recommendations

NURS122 should be reviewed to establish the reasons for students' academic difficulties with this subject.

The SS should be used to identify students with low self-efficacy and measures be taken to increase their confidence in science.

5.3.4 TER Score and Academic Performance

In accordance with Australia-wide trends (DEET, 1990), students attracted to this Bachelor of Nursing course generally have a low TER score. Their median TER score is well below that of other courses offered by the university (see Table 3.2). Thus it could be concluded that nursing is a low status undergraduate course.

As anticipated, students' TER score was a poor predictor of their academic performance (see Table 4.2). In fact, it was not statistically significantly correlated with students' academic scores in any of the subjects in the first year of the undergraduate nursing course. It is important that alternative means of identifying students' academic performance, such as the SS, be developed to assist in the identification of students who will have difficulties with an undergraduate nursing course.

The median score for the cohort was 60.05 (see Table 3.1) at the commencement of the course, however, for second session it was found to be 62.5 (Table 4.1). Attrition of students with a low TER score during the first session might be an explanation.

Recommendations

The relationship between students' TER score, academic performance and withdrawal in the first year of an undergraduate nursing course should be investigated.

5.4 Demographic Data

5.4.1 Introduction

Conclusions for the demographic data are given in this section, including those for the cohort and for male students. Conclusions about the relationship of demographic data with academic performance and self-efficacy are also presented. Recommendations for each sub-section are listed.

5.4.2 Demographic Data and the Cohort

Wollongong nursing students are predominantly female (87%) reflecting nursing's traditional status as a female profession. The percentage of males entering the course is in accordance with Australian statistics for undergraduate nursing courses (DEET, 1991).

The greatest proportion of students entering the course are admitted directly from high school on the basis of their HSC/TER score (Appendix 5). About one quarter of the students are admitted on the basis of "mature-age/other" entry criteria. The "other" category includes Aboriginal/Torres-Strait, disadvantaged and so on. The sub-groups within the "other" category are small.

Most nursing students in the cohort were born in Australia/NZ/UK (95%) and speak English (92%) at home (Appendix 5). These figures are in accordance with previous research findings for nursing students (Neill & Barclay, 1989). Nevertheless, it appears that a significant proportion of students are first generation children of migrants from non-English speaking countries, with 25% of students' fathers and 16% of their mothers born in countries other than Aust/NZ/UK.

5.4.3 Demographic Data and Male Students

The males in the cohort are most likely to enter higher education directly from high school, with only two students admitted on the basis of mature-age entry. Hence they are younger than their female counterparts and most likely to be single (Appendix 5).

Whilst all were born in Aust/NZ/UK, male students were more likely than the cohort to be first generation children of migrant families, with 36% having fathers born in countries other than Aust/NZ/UK (Appendix 5).

5.4.4 Demographic Data and Academic Performance

The demographic data analysed in this study included students' age, marital status, ethnicity and mode of entry into the course. The variable of ethnicity was measured by the birthplace of a student's father.

Mature age students are considered to be highly motivated to succeed (Caon & Treagust, 1992). The extent to which this results in academic success is uncertain, although there is a perception in nursing that mature age students perform better academically than their younger peers.

Demographic data were not related to academic performance in this study (see Tables 4.4, 4.5). Students whose marital status was defined as married/defacto obtained higher mean GPA and WAM than single students. Students entering via the "mature-age/other" category also obtained higher mean GPA and WAM than those admitted on the basis of HSC/TER score. Nevertheless, none of these demographic variables were statistically related to overall academic performance. For these demographic characteristics, a student's age came closest to reaching statistical significance.

A student's age, marital status and entry via the "mature-age/other" category to a course could be considered to be interrelated. For example, "mature-age/other" students are more likely to be older and married than students entering the course on the basis of HSC/TER. Thus only one of these variables, preferably student's age, may be necessary when examining this area in relation to its influence on academic performance.

A student's ethnicity was measured by father's birthplace. It was anticipated that a student's ethnicity would be related to a higher academic performance, as ethnicity has been found to be a significant factor in students seeking university education and achieving university qualifications (Birrell, 1994; Birrell & Siew-Ean Khoo, 1995). In this study, students with fathers born in countries other than Aust/NZ/UK were found to have a lower mean GPA and WAM scores than those with fathers born in Aust/NZ/UK (Table 4.4).

Few studies have examined students' ethnicity and academic performance in undergraduate nursing courses, possibly because nursing students are predominantly Australian born. No distinction was made between those Australians from Aboriginal/Torres Strait backgrounds because of the small numbers of students involved, which would have been insufficient for statistical analysis. Ethnicity however, has been found to be related to persistence in a nursing course (Burgum et al, 1993), with students who were born in Australia but did not speak English as a first language most likely to remain in a nursing course.

Whilst the relationship between fathers' ethnicity and overall academic performance was not statistically significant, given the numbers involved, this area requires further investigation.

Recommendations

A student's age in preference to marital status or mode of entry to a course should be used when examining the relationship between demographic data and academic performance.

Additional studies should be conducted to investigate the relationship between nursing students' ethnicity, including family background, and academic performance.

5.4.5 Self-Efficacy and Demographic Data

Students' self-efficacy for science was not related to their gender. Therefore it can be concluded that the SS does not have a gender bias.

5.5 Social Characteristics

5.5.1 Introduction

In this section, conclusions and recommendations for the social characteristics of the cohort and males are presented. The section also includes conclusions regarding the relationship between social characteristics with academic performance and self-efficacy.

5.5.2 Social Characteristics and the Cohort

The SES background of students was measured by three indices: schooling, parent occupation and education. Traditionally only fathers' social characteristics are analysed to determine SES. Researchers examining SES and academic performance, however, have found the traditional means of assessing the SES of nursing students inadequate (Burgum et al, 1993).

In this study, the mothers' and fathers' occupation and education were analysed separately. By doing this, information about mothers' influences on nursing students could be elicited, as, whilst nursing is a predominantly female profession, little is known about the social characteristics of their mothers. Also, with women increasingly entering and remaining in the workforce, the influence of mothers on students' SES cannot be ignored. This fact was confirmed, with the findings that more mothers in the study were working than staying at "home", with 28% employed in "home-duties" (Appendix 6). This percentage was significantly less than a South Australian study (Neill & Barclay, 1989) which found 40% of nursing students mothers were employed in "home-duties".

Surprisingly, students' mothers in this study had a similar percentage of degree qualifications as fathers (26.9%, 27.3% respectively, Table 4.6). These percentages are significantly above previous findings (Neill & Barclay, 1989) where only 17% of nursing students' fathers were found to have a baccalaureate degree or higher, with mothers having less of these qualifications than fathers. The fact that 16.6% of the cohort have mothers who are nurses (Appendix 6), combined with the move to tertiary educational institutions and subsequent awarding of baccalaureate degrees for nursing, might explain the high percentage mothers with degrees. Overall, however, more mothers in the study had only a secondary education or less.

Much of the contradictory nursing SES information can be attributed to the fact that the studies (Neill & Barclay, 1989; Wright, 1988) were conducted during the transitory period of nursing education, when hospital-based and higher education courses were being conducted concurrently. Studies conducted since the closure of all hospital-based courses will be more reflective of the SES of present nursing students.

In this study, although all SES groups were represented, the cohort could be classified as coming from a medium to high SES background with 58% of fathers and 51% of mothers having occupations categorised as semi-professional, professional or managerial/administration (Table 4.6). With more nursing students in this study coming from the medium-to-high SES background, it can be concluded that nursing is fully integrated into the tertiary sector, and now reflects the traditional class biases present in higher education.

Nursing students appear to be taking advantage of the expanding availability of part-time/casual work in nursing, and hence appear to be relying less on government financial assistance. Only 30% of nursing students in this study were found to receive government financial assistance (Austudy/Abstudy, Appendix 6). This is considerably less than previous studies, which found from 40% (Burgum et al, 1993) to 54% (Wright 1988) of nursing students receiving assistance.

Recommendations

Future studies develop and employ techniques for measuring SES that include mothers' occupation and education.

New studies should be conducted to collect information about the present SES of nursing students, and that this information be compared to previous nursing studies of SES to fully determine the impact of the move of nursing to higher education.

5.5.3 Social Characteristics of Male Students

The social characteristics varied from those of the cohort. Unlike females they did not have mothers who were nurses (Appendix 6). Male students were more likely than females to have parents in the low and not-employed SES occupational groups (Table 4.6). They may be getting their encouragement from their mothers to enter higher education, as their mothers were twice as likely than their fathers to have a degree (Appendix 6).

5.5.4 Social Characteristics and Academic Performance

For the three SES indices, only mothers' occupation was found to influence nursing students' overall performance in the first year of an undergraduate nursing course (Table 4.7). Previous SES measures have failed to measure a mothers' SES background. With less women employed in "home-duties" and more participating in the workforce, the influence of mothers cannot be ignored. In this study, mothers' occupation level was more influential on their offspring's overall academic performance than a father's education or occupation.

Contrary to expectations, students with mothers in the low SES group performed significantly below that of students from the middle or not-employed group ($p=0.05$). By contrast, the study by Burgum et al (1993) found that nursing students from a lower SES background performed better academically than those from a higher SES. However, the results were statistically weak, with the acceptance of the conventional alpha 0.1 for the sample size of 106 (Burgum et al, 1993).

Recommendations

Additional studies should be conducted to investigate the influence of mothers' SES on the academic performance of nursing students.

5.5.5 Social Characteristics and Self-Efficacy

In this study, whilst females from single-sex schools had a lower self-efficacy for science than those from co-ed schools, this difference was not statistically significant (Table 4.8). Female students' self-efficacy for science (SS) was not influenced by attendance at single-sex or co-ed schools. With some schools now offering single-sex classes for science, assessing the manner in which science was taught might be a better way of determining the influence of this factor on science self-efficacy.

Recommendations

Information about students' attendance in single-sex or mixed-sex science classes should be collected to determine what this effect has on students' self-efficacy for science.

5.6 Vocational Choice

5.6.1 Introduction

In this section, conclusions about the vocational choice of the cohort and male students are given. Conclusions about the AN tool including its reliability and validity are discussed. Conclusions regarding vocational choice and its relationship with academic performance and self-efficacy are also presented. Specific recommendations for this section are listed after the appropriate sub-sections.

5.6.2 Vocational Choice and the Cohort

For approximately three quarters of the students, nursing was their first vocational choice, with more than half making their decision one year before the commencement of the course (Appendix 7).

With a dominant image of caring, it is not surprising that nursing students cite "caring for others" as a major reason for choosing a nursing course (Appendix 7). However, this classic response is second, with students choosing personal satisfaction as their main response for their vocational choice. This is in accordance with previous research findings (Neill & Barclay, 1989). The third most chosen response was "to establish a good career".

As students' AN and reasons for choosing nursing were statistically related at the p=0.01 level (Table 4.11) in this study, further examination of this relationship is warranted with a larger cohort.

Recommendation

Further investigation of the relationship between students attitudes to nursing and their reasons for choosing should be conducted.

5.6.3 Vocational Choice and Male Students

Nursing is an attractive option to some males who have a low TER score which is insufficient to enable them to enter other tertiary courses. This is supported by the fact, that males have a lower mean TER score than females, and 27% cite "TER score insufficient for other courses" as a major reason for choosing the course (See Table 4.1 & Appendix 7). In addition, the course was not a first choice for 36% of male students.

Recommendation

Further investigation of males' reasons for entering a nursing course should be conducted.

5.6.4 Vocational Choice and Academic Performance

It appears that choosing nursing as a first choice is related to academic performance in a nursing practice subject, with students who choose it as a first preference performing better than those for whom it was not a first choice (Table 4.10). Choosing nursing as a first preference therefore appears to motivate a student to succeed in a subject, which clearly relates to their vocational choice .

5.6.5 AN Introduction

The AN was a researcher-developed tool with nine items and was devised to measure students' attitudes to nursing. It was designed with the purpose of prediction of academic performance in a nursing practice subject.

Nursing students were found to be relatively homogeneous in their attitudes to nursing and the AN tool appeared to tap into these attitudes (Table 4.9, Appendix 8). Generally students found caring for patients rewarding, helping a patient recover from an illness personally satisfying and strongly recognised that nursing often involves team work. They are less likely to understand that relatives of patients need reassuring and don't always find nursing exciting. The T-test result indicated that the AN was not gender-biased (4.9).

Conclusions about the reliability and validity of the AN are presented in the following sub-sections.

5.6.6 AN Reliability

Cronbach alpha was used to determine the internal consistency of the AN. Cronbach alpha is a general reliability estimate that evaluates the degree to which the items on a test measure the same trait (Kaplan & Saccuzzo, 1993, p115).

The Cronbach alpha coefficient for the nursing section is alpha=0.67 which, although, it is in the range considered satisfactory for research purposes (Kaplan & Saccuzzo, 1993, p126), could be improved. The cohort were a relatively homogeneous group in their attitudes to nursing, and the alpha level of the AN (Table 4.9) is a reflection of this homogeneity (Drummond, 1988). By increasing the number of items, the reliability of this section could be enhanced.

5.6.7 AN Predictive Validity

Prediction validation is performed by correlation analysis to examine the relationship between the test (AN) and the criterion (academic performance). "This correlation is called a *validity coefficient*, and it tells the extent to which the test is valid for making statements about the criterion" (Kaplan & Saccuzzo, 1993, p140). These correlation results are given in Table 4.18. The validity coefficient can be squared to explain the percentage of a student's academic performance we can expect to know in advance because of our knowledge of their AN scores (Kaplan & Saccuzzo, 1993, p141).

The AN could predict 6.8% (r=0.26) of students' academic performance for NURS121(1) and 6.8% (r=0.26) for NURS121(A).

5.6.8 AN: Further Conclusions

Whilst the AN could predict academic performance in NURS121, it was not a strong predictor. In fact, students' self-efficacy for science was a better indicator of academic performance in the first session NURS121(1), although by second session this situation was reversed. The AN could not predict overall academic performance.

However, as the AN did appear to tap into attitudes relevant to nursing, the tool may be a better indicator of persistence in a nursing course.

Recommendation

The relationship between AN and persistence in nursing be investigated.

5.7 Gender Characteristics

5.7.1 Introduction

In this section, the conclusions about the gender characteristics of the cohort are discussed. Then, the conclusions about gender characteristics and its' relationship to academic performance and self-efficacy are given.

5.7.2 Gender Characteristics and the Cohort

Students in the cohort were predominantly androgynous in their gender identity as measured by the BSRI (Table 4.12). Students' BSRI Masculinity and Femininity scores were higher and lower for the appropriate gender, although, the difference between the scores was greater for males (7.03) than females (-1.70). This suggests that the females were more androgynous than their male counterparts.

Findings for the prototype similarity profiles were in accordance with these findings with little difference found between females' scores for the masculine and feminine profile, whilst there was a greater variation between them for males. This suggests that whilst the males in the cohort were mainly androgynous, for some, their masculine gender characteristics were far stronger than their feminine characteristics (Table 4.12). Possession of strong masculine gender characteristics must cause a degree of gender-role conflict to males entering nursing which is considered a traditionally female vocational choice. In nursing, gender-role conflict and motivation have been found to apply to female students, with less gender-role conflict resulting in higher motivation (Muldoon & Kremer, 1995). Is it possible that this situation is reversed for males with more gender-role conflict leading to lower motivation to study? It might help to explain their attrition rate from a nursing course.

Recommendations

Both Masculinity and Femininity scores should be used in studies where the relationship between gender characteristics and a variable are being examined. Also, the androgyny of the sample be determined.

Gender-role conflict experienced by males be investigated to determine its effect on students' motivation.

5.7.3 Gender Characteristics: Academic Performance and Self-Efficacy

As anticipated, for females and the cohort, Masculinity scores were related to their self-efficacy expectations for science (SS, Table 4.13). For the cohort, students with higher BSRI Masculinity scores, are more confident in their overall science self-efficacy expectations (SS) and the sub-sections NS and MS. For males, having more feminine characteristics leads to less confidence in science (Andrew, 1994).

Unexpectedly, females with high feminine characteristics were also confident in the MS section of the SS. This can be explained by their androgyny, that is students with high masculine and feminine attributes also have a high SS.

If Masculinity scores are related to science self-efficacy, it would be expected that they would also be related to a science-based subject. Indeed as expected, Masculinity scores were related to self-efficacy expectations for the second session (SEFFYS) science subject SCIE111 (Table 4.14). They were also related to another "masculine-typed" subject involving research methods (NURS124, Table 4.14). In fact, research has such a strong masculine image that if females are to feel confident in this subject area, they need to have strong masculine characteristics (Andrew, 1994).

This is in accordance with overseas research findings which also found, for nursing students, masculinity and expectations for success in learning research methods were related (Barron, 1989).

Femininity scores were not correlated with self-efficacy for NURS121, a "feminine-typed" subject, although they were close to reaching statistical significance.

Although students with higher Masculinity scores have a higher self-efficacy for science and research-based, in other words "masculine-typed", subjects this is not reflected in their academic performance. Masculinity scores were not related to academic performance in SCIE110, SCIE111 or NURS124. Although the correlations between students' Masculinity scores for NURS124 were higher than the Femininity scores, they were not statistically significant. It appears that students are able to overcome their lack of confidence in this area and to achieve academic success. Perhaps their lowered self-efficacy expectations motivate them to spend more time studying the subject and achieve academic success (see Figure, 2.1).

Unexpectedly, Femininity scores for the cohort and females were found to correlate with academic performance in SCIE111, whilst Masculinity scores were not related (Table 4.14). As this science-based subject contains aspects of biology and the female students are more likely to have studied biology at school (see Appendix 11), a student's past performance attainments may be more important for academic success in this subject.

The mixed results for the females in this study can be explained by their androgyny, that is their possession of high masculine and feminine characteristics, with little difference between their Masculine and Feminine scores. This leads to the conclusion, that where a sample of females are predominantly androgynous, the use of Masculine or Feminine scores are not useful in assessing self-efficacy or academic performance.

It has become accepted practice to use only Females' Masculinity scores (see for example Barron, 1987; Fassinger, 1985; O'Brien & Fassinger, 1993) when investigating areas assumed to relate to masculine attributes. However, the results for this study suggest that it is not appropriate to use one aspect of gender-related characteristics alone to make assumptions about the behaviour of females. Indeed both Masculinity and Femininity scores should be used in studies where the relationship between gender characteristics and a variable is being examined. Also, the androgyny of the sample should be determined as this aspect may be more important than masculinity alone.

The fact that females are predominantly androgynous leads to the conclusion that females have changed since the development of the BSRI and now ascribe to themselves characteristics previously thought to be masculine. It is also encouraging to find that female nursing students are not overwhelmingly feminine in their characteristics as previous research (overseas) has shown them to be (Bough, 1988; Till, 1980; Vandever, 1978).

As the male students were less androgynous than the females, the results for the BSRI were less contradictory for them. Higher correlations were found between males' Masculinity scores and the SS including all of its subsections although they were not statistically significant (Appendix 9). Conversely, Femininity scores were negatively related to SS and all of its sub-sections except for FS. In other words, males with more feminine gender characteristics had lower overall SS and for the sub-sections NS, MS and MAS. However, they had higher self-efficacy expectations for FS. This relationship is reflected more clearly in the prototype similarity profiles where males' MP scores were statistically significantly correlated to NS and MAS. However males' FP scores were negatively related to the NS and MAS areas of the SS.

Thus, males who enter nursing with strong feminine characteristics, may feel stressed by the science component in an undergraduate nursing course. In fact, these males may be at more of a disadvantage in nursing than females with correspondingly high feminine characteristics or males with high masculine characteristics.

It can be concluded that the BSRI is more useful where a sample is less androgynous, with a significant difference between the Masculinity and Femininity scores.

Females' Masculinity scores and attitudes to feminism have been found to be related to occupational choice (Fassinger, 1985; O'Brien & Fassinger, 1993), with stronger scores on both related to women choosing non-traditional women's occupations. The findings for female students' attitudes to feminism were therefore in accordance with expectations that students in traditional female occupations are less likely to be committed to feminism. The female students rejected the term feminist when applied to themselves, and the use of the title Ms.

However, due to the androgyny of the females there were no statistically significant differences between Masculinity scores and students' attitudes to feminism (Table 4.15). Again this leads to the conclusion, that both Masculinity and Femininity scores should be used in studies where the relationship between gender characteristics and a variable is being examined, and that the androgyny of the sample should be determined.

Recommendations

Additional studies be conducted to examine the relationship between male students' gender identity, with gender-role conflict, science self-efficacy, academic performance and attrition from undergraduate nursing courses.

Comparative studies be conducted to determine if nursing attitudes to feminism are significantly different to females in non-traditional courses in other Australian undergraduate courses.

5.8 Self-Efficacy

5.8.1 Introduction

Self-efficacy was measured by three tools: the SS, SEFFYS and SEFCC. Conclusions for each tool are discussed separately.

5.8.2 SS Introduction

The SS was a researcher-developed tool containing twenty one science tasks and was devised to determine a student's self-efficacy for science. It was designed with the prediction of academic performance in first year science subjects in an undergraduate nursing course. The SS was further divided into sub-sections containing MS (Masculine Science), FS (Feminine Science), NS (Neutral Science) and MAS (Mathematics Science) items. The t-test results indicate that the SS is not gender-biased (4.16). The reliability and validity of the SS are discussed in the following sub-sections.

5.8.3 SS Reliability

Reliability estimates in the range of 0.70 and 0.80 are considered "good enough for most purposes of basic research" (Kaplan & Saccuzzo, 1993, p126).

The Cronbach alpha coefficients for the SS and its sub-sections are given in Table 4.16. The SS with a Cronbach alpha of 0.9 has a high internal consistency. This indicates that this is a highly reliable tool that does not require further changes for research purposes (Kaplan & Saccuzzo, 1993, p126).

5.8.4 SS Predictor Validity

The content (face) validity was discussed in section 3.8.2. Through the research hypotheses further information about the validity of the SS tool was investigated. In this section Predictor (criterion-related) Validity of the SS is discussed.

The SS was devised specifically for the prediction of academic performance in the first year of an undergraduate nursing course. It therefore required prediction validation, with the SS regarded as the predictor variable and academic performance the criterion. In this section Predictor (criterion-related) Validity of the SS is discussed.

Correlation results (Table 4.18, Appendix 10) demonstrate that the SS can predict 24% (r=0.49) of students' academic performance in SCIE110, 18% (r=0.43) in SCIE111 and 11% (r=0.33) for the GPA. These predictions are stronger for males, with 62% (r=0.79) for SCIE110, 56% (0.75) for SCIE111 and 61% (r=0.78) for the GPA.

If validity correlations in the range of 0.30-0.40 (9-16%) are considered high for predictive validation studies (Kaplan & Saccuzzo, 1993, p141), it can be concluded that the SS is highly predictive of academic performance in science-based subjects and overall academic performance in the first year of an undergraduate nursing course. In addition, it is exceptionally predictive for males, as Kaplan & Saccuzzo (1993, p141) state that "... it is rare to see validity coefficients larger than 0.60".

Thus, it can be concluded that the SS is a tool that may be predictive of academic performance in science-based subjects in the first year of an undergraduate nursing course. It could be used to identify students with a low self-efficacy for nursing and science, and hence at risk of achieving low academic performance in these areas of the first year curriculum.

5.8.5 SS Further Conclusions

Nursing students have frequently been identified as having difficulties with their science subjects in undergraduate nursing courses (Bishop, 1990; Caon & Treagust, 1992; Cooper et al, 1992; Kershaw, 1989) and to have a low opinion of their ability to study science (Caon & Treagust, 1993). Thus according to expectations, students entering this nursing course are not confident in performing science-tasks. The first session contains physics and chemistry, yet students are most likely to have studied biology for the HSC. So, it is not surprising to find that students' self-efficacy for science is not influenced by their HSC background.

The SS tool may be a way of identifying students' self-expectations about their science subjects, as it can predict academic performance in the science areas of the first year curriculum. In the first session it can also predict academic performance in an introductory nursing subject, and is very close to predicting academic performance in a psychology subject. Thus, the SS has demonstrated that it may be a useful tool in the prediction of academic performance in the first session of a nursing course.

Students' self-efficacy for science is also related to their overall academic performance and the SS is a better predictor of this than students' TER score.

Whilst nursing continues to attract and admit students to an undergraduate nursing course with a limited science background, it requires means for identifying students who are likely to be academically unsuccessful in the course. By assessing a student's science self-efficacy, it may be possible to identify these students, and develop educational strategies to assist them to improve their academic performance in the science-based areas of their nursing course.

5.8.6 SEFFYS

Students are able to predict their academic performance early in the session, as, the strength of their self-efficacy for a subject was related to academic achievement in that subject. This relationship was statistically significant for NURS121(A) and SCIE111 suggesting that they have gained feedback from their performance attainments in the first session. Given that students have also had feedback for NURS122(A) they should be better able to predict their performance in that subject. Again this leads to the conclusion, that this subject warrants investigation.

As students have not studied research methods (NURS124) before, they have limited performance attainments on which to base their self-efficacy expectations, therefore, the findings for this subject are in accordance with expectations.

Analysis of hypothesis 19 did not proceed as no students who failed gave permission for the collection of their academic results. Nevertheless, it can be concluded that students who fail SCIE110 are reluctant to disclose their failure to others, indicating that it appears to have an effect on their behaviour.

A student's self-efficacy for a subject and their interest in that subject are related. Students who have a lower self-efficacy for a subject express less interest in that subject. It is not known whether students also spend less time studying a subject for which they have a low self-efficacy leading them to fulfil their expectations by getting a lower score for the subject (see Figure 2.1).

Recommendations

NURS122 should be investigated to determine students' expectations regarding the subject.

5.8.7 SEFCC

Whilst students who choose the course as a first preference have stronger self-efficacy expectations for course completion, this variable was not statistically significant. It is possible, however, that it might be a reason for students' persistence in a course and warrants further examination in relation to this area.

Recommendations

A study should be conducted to determine if self-efficacy for course completion is related to students' persistence in a nursing course.

5.9 Male Students: Final Conclusions

The number of male students in the cohort was small (11) hence conclusions regarding them should be treated with caution, and require further investigation with a larger sample of students. Nevertheless, they did vary from their female counterparts in some of the areas examined in the study.

For example, males appear to get their encouragement to enter higher education from their well-educated mothers.

In addition, male students entering a nursing course are more likely to have much stronger masculine than feminine characteristics. These males must suffer some degree of gender-role conflict entering a traditionally female occupation.

The male students who are attracted to nursing because they have strong feminine characteristics, seem to be at more of a disadvantage than females in the science-areas of the course. These males have a low self-efficacy for science. As males are less likely to be androgynous, the BSRI may be a useful tool, when examining the relationship between gender characteristics and other variables such as self-efficacy for science.

The SS demonstrated that it was highly predictive of male students' academic performance in the science-based areas of the curriculum in the first year of an undergraduate nursing course. The SS was able to predict 62% of male students' academic performance in SCIE110 and 56% for SCIE111. In addition it could predict 42% of the WAM. Given the small number of male students involved in the study, this area requires further investigation.

5.10 Final Conclusions

Nursing students are not confident in performing science tasks, many of which are performed everyday. It is not surprising, therefore, that they have anxieties about the science-areas of a nursing curriculum, particularly as they are likely to have a limited HSC science background. By assessing students' self-efficacy to science it may be possible to identify students at risk of failing or withdrawing from a course.

Many of the students entering nursing are likely to have a low TER score, and their TER score will be unrelated to their subsequent academic performance in the first year of an undergraduate nursing course. It is important that alternative means for identifying students at academic risk in the first year of the course be developed. The SS was a better predictor of academic performance than students' TER score, for most of the first year undergraduate subjects and their overall academic performance. This is the first documented study of an Australian-developed self-efficacy tool being used to predict academic performance in the science-based areas of an undergraduate nursing course.

The SS was found to have a high internal consistency and to have predictive validity for students' academic performance, particularly in the science-based areas of the curriculum. By using the SS, students with low self-efficacy could be identified and measures be instituted to increase their science self-efficacy expectations. This could be achieved by conducting sessions where the application of science to every-day tasks is presented, before students are taught about those aspects of science relevant to nursing practice. Students may then perceive science as relevant to their everyday life, reducing their anxieties and changing their perceptions of it as difficult. This may increase students' academic performance and reduce the attrition of students from a nursing course.

Nursing students are a relatively homogeneous group in their attitudes to nursing as shown by the AN, a researcher-developed tool. Although students' attitudes to nursing are related to academic performance in an introductory nursing subject, unlike the SS, they are not related to overall academic performance. The reliability of the AN needs to be enhanced, possibly by the inclusion of more items. Given the homogeneity of the cohort, the AN may be more useful in predicting persistence in a nursing course, and this area warrants further investigation

Although nursing is a traditionally female profession, the relationship between students' performance and the social characteristics of their mother has been largely ignored in Australian nursing studies. In this study, a mother's occupation was found to be related to the student's academic performance. Demographic data were found not to be statistically related to students' academic performance.

Students are accurate predictors of their subsequent academic grades and it may be useful to utilise the SEFFYS in conjunction with the SS when examining students' academic performance.

The aim of this study was achieved. Non-academic factors were identified and grouped into categories. Variables relating to these categories were examined to determine whether there was a relationship between them and academic performance in the first year of an undergraduate nursing course. In addition, a reliable and valid tool called the Self-Efficacy for Science (SS) was developed to be used in the prediction of students' academic performance in the first year of an undergraduate nursing course.

5.11 List of Recommendations

• Students should be surveyed in the first session of their first year to investigate the characteristics of students leaving the course.

• Future studies should use GPA and either WAM or AM (not both) for measuring students' overall academic performance.

• NURS122 should be reviewed to establish the reasons for students' academic difficulties with this subject.

• The SS should be used to identify students with low self-efficacy and measures be taken to increase their confidence in science.

• The relationship between students' TER score, academic performance and withdrawal in the first year of an undergraduate nursing course should be investigated.

• A student's age in preference to marital status or mode of entry to a course should be used when examining the relationship between this demographic data and academic performance.

• Additional studies should be conducted to investigate the relationship between nursing students' ethnicity, including family background, and academic performance.

• Future studies develop and employ techniques for measuring SES that include mothers' occupation and education.

• New studies should be conducted to collect information about the present SES of nursing students and that this information be compared to previous nursing studies of SES to fully determine the impact of the move of nursing to higher education.

Additional studies should be conducted to investigate the influence of mothers' SES on the academic performance of nursing students.

• Information about students' attendance in single-sex or mixed-sex science classes be collected to determine what this effect has on students' self-efficacy for science.

• Further investigation of the relationship between students' attitudes to nursing and their reasons for choosing should be conducted.

• Further investigation of males' reasons for entering a nursing course should be conducted.

• The relationship between AN and persistence in nursing be investigated.

• Both Masculinity and Femininity scores should be used in studies where the relationship between gender characteristics and a variable are being examined. Also, that the androgyny of the sample be determined.

• Gender-role conflict of males should be investigated to determine its effect on students' motivation.

• Additional studies should be conducted to examine the relationship between male students' gender identity, with gender-role conflict, science self-efficacy, academic performance and attrition from undergraduate nursing courses.

• Comparative studies should be conducted to determine if nursing attitudes to feminism are significantly different to females in non-traditional courses in other Australian undergraduate courses.

• NURS122 should be investigated to determine students' expectations regarding the subject.

• A study be conducted to determine if self-efficacy for course completion is related to students' persistence in a nursing course.

5.12 Key Recommendations

Additional studies of the SS should be conducted with other nursing cohorts to further validate its predictive abilities of students' academic performance in the first year of an undergraduate nursing course.

Further, the SS should be used to identify students with low self-efficacy, and educational strategies be developed to assist them to improve their academic performance in the science-based areas of a nursing course.

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GLOSSARY

Glossary

ABS	Australian Bureau of Statistics
Academic Score	Academic mark for first year subject
AM	Average Mark
AN	Attitudes to Nursing
AP	Androgynous Profile
Autumn session	first session of the academic year (March-July)
BSRI	Bem Sex-Role Inventory
Co-Ed	Co-Educational School
Cohort	All students enrolled in the undergraduate nursing course
Cut-Off TER	Minimum TER score accepted as entry for an university course
DEET	Department of Employment, Education and Training
F	Females
Femininity	those attributes stereotypically associated with the female gender
FP	Feminine Profile
Femininity score	mean score for the femininity items on the BSRI
first session	Autumn session of the academic year (March-July)

FS	Feminine Science Score for SS
GPA	Grade Point Average
HSC	High School Certificate
LASSI	Learning and Study Strategies Inventory
M	Males
MAE	Mature-Age Entry
MAS	Mathematics Science Score for SS
Masculinity	those attributes stereotypically associated with the male gender
Masculinity score	mean score for the masculinity items on the BSRI
Maths	Mathematics
Max	Maximum
Min	Minimum
MP	Masculinity Profile
MS	Masculine Science Score for SS
MSES	Mathematics Self-Efficacy Scale
n	Number of observations
NASES	Nursing Academic Self-Efficacy Scale
NCLEX-RN	National Council for Licensing Examination for Registered Nurses (USA)
NCSES	Nursing Clinical Self-Efficacy Scale

NURS121	Foundations of Nursing Care
NURS121(1)	Academic results (unofficial) for first session subject NURS121
NURS121(A)	Annual (second session overall) academic results for NURS121
NURS122	Professional Studies
NURS122(1)	Academic results (unofficial) for first session subject NURS122
NURS122(A)	Annual (second session overall) academic results for NURS122
NURS123	Introductory Psychology for Nurses
NURS124	Introduction to Research
NS	Neutral Science Score for SS
NSW	New South Wales
NZ	New Zealand
p	Statistical Probability Value
Pre-admission	student's entry characteristics
PSAT	Preliminary Scholastic Aptitude Test (USA)
Q	Question
r	correlation coefficient
SAT	Scholastic Aptitude Test

SECC	Self-Efficacy for Course Completion
second session	Spring session of the academic year (July-December)
SEFFYS	Self-Efficacy for First Year Subjects
SES	socio-economic status
SCIE110	Human Bioscience 1
SCIE111	Human Bioscience
SD	Standard Deviation
Spring Session	second session of the academic year (July-December)
SS	Self-Efficacy for Science
TER	Tertiary Entrance Rank
UK	United Kingdom
USA	United States of America
UP	Undifferentiated Profile
VCE	Victorian Certificate Education
WAM	Weighted Average Mark
WPA	Weighted Point Average

APPENDIX 1

Attitudes to Nursing

APPENDIX 1

Attitudes to Nursing

Below are set of statement about nursing. Please indicate on the scale your attitude towards each of these statements by ticking the appropriate box.

	1	2	3	4	5
1 Caring for sick people is:	**Tedious**				**Rewarding**
	❑	❑	❑	❑	❑
2 Nursing is interesting:	**Sometimes**				**Always**
	❑	❑	❑	❑	❑
3 Relatives of patients are:	**Demanding**				**Need Reassuring**
	❑	❑	❑	❑	❑
4 Nursing involves team work:	**Never**				**Often**
	❑	❑	❑	❑	❑
5 Nurses need to understand the reasons for a patient's actions:	**On some occasions**				**On most occasions**
	❑	❑	❑	❑	❑
6 Helping a patient recover from an illness is:	**Not Personally Satisfying**				**Personally Satisfying**
	❑	❑	❑	❑	❑
7 Explaining a procedure to a patient is:	**Mundane**				**Challenging**
	❑	❑	❑	❑	❑

8 **Talking to a patient is:**

Boring				Interesting
❑	❑	❑	❑	❑

9 **Nursing is exciting:**

Rarely				Always
❑	❑	❑	❑	❑

APPENDIX 2

Self-Efficacy for Science

APPENDIX 2

Self-Efficacy for Science

Below are descriptions of some science tasks. Please indicate on the scale the confidence you have in your ability to successfully perform each of these tasks by ticking the appropriate box.

1 Dissolve sugar in a drink by changing the drink's temperature.

Not confident			Very	confident
❑	❑	❑	❑	❑

2 Read a cake recipe and decide what the raising agents are.

Not confident			Very	confident
❑	❑	❑	❑	❑

3 Work out if a 120V electric razor (bought in the U.S.A.) would work if plugged into your electrical powerpoint.

Not confident			Very	confident
❑	❑	❑	❑	❑

4 Determine why the rake you left out in the rain has gone rusty.

Not confident			Very	confident
❑	❑	❑	❑	❑

5 Calculate whether the 4kW electrical circuit in your kitchen will enable you to run a 2.4kW space heater, 600W toaster and a 1200W kettle.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

6 Make a paper dart and choose a shape that will make it fly faster.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

7 Decide whether a still or windy day is better for drying your clothes.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

8 Convert John's dietary intake of 2500cal to kJ given that 1 calorie=4.185J.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

9 Decide whether oiling your bicycle will make it go slower or faster.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

10 Calculate how much water you will need to make a 600ml 1:20 solution of disinfectant for your toilet.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

11 Work out if a white spot on your overalls, caused by splashing it with bleach, can be removed by machine washing.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

12 Give examples of an electrical conductor and insulator.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

13 Figure why the aircraft moving away from you has a lower frequency compared with its frequency when overhead.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

14 Decide whether covering a water filled saucepan with a lid will increase or decrease the time it will to boil.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

15 Suck some water up in a straw and work out how to keep it in the straw.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

16 Calculate the changes in the thoracic cavity if the pressure in the lung changes from +1mmHg to -8mmHg with respect to normal atmospheric pressure of 760mmHg.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

17 Convert a pressure reading of 120mmHg into kPa given that 660mmHg=87.9kPa.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

18 Estimate the cost of running a 800W radiator for 6 hours at a charge of 14 cents

Not confident Very confident

❑ ❑ ❑ ❑ ❑

19 Choose whether it would be sensible to wear smooth soled or ripple soled shoes to a wet football oval.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

20 Understand why water droplets are running down the inside of a misty window pane on a cold day.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

21 Decipher a can labelled 'contains baked beans, sucrose, and sodium chloride' to see if it contains salt and sugar.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

APPENDIX 3

Self-Efficacy for Science: Sub-Sections and Items

APPENDIX 3

Self-Efficacy for Science: Sub-Sections and Items

Neutral Science (NS) 5 Items

SS No	Item
1	Dissolve sugar in a drink by changing the drink's temperature.
12	Give examples of an electrical conductor and insulator.
15	Suck some water up in a straw and work out how to keep it in the straw.
20	Understand why water droplets are running down the inside of a misty window pane on a cold day.
21	Decipher a can labelled 'contains baked beans, sucrose, and sodium chloride' to see if it contains salt and sugar.

Feminine Science (FS) 5 Items

SS No	Item
2	Read a cake recipe and decide what the raising agents are.
7	Decide whether a still or windy day is better for drying your clothes.
11	Work out if a white spot on your overalls, caused by splashing it with bleach, can be removed by machine washing.
14	Decide whether covering a water filled saucepan with a lid will increase or decrease the time it will take to boil.
19	Choose whether it would be sensible to wear smooth soled or ripple soled shoes to a wet football oval.

Masculine Science (MS) 5 Items

SS No	Item
3	Work out if a 120V electric razor (bought in the USA) would work if plugged into your electrical power-point.
4	Determine why the rake you left in the rain has gone rusty.
6	Make a paper dart and choose a shape that will make it fly.
9	Decide whether oiling your bicycle will make it go slower or faster.
13	Figure why the aircraft moving away from you has a lower frequency compared with its frequency when overhead.

Mathematics-Science (MAS) 6 Items

SS No	Item
5	Calculate whether the 4kW electrical circuit in your kitchen will enable you to run a 2.4kW space heater, 600W toaster, and a 1200W kettle.
8	Convert John's dietary intake of 2500cal to kJ given that 1 calorie = 4.185J.
10	Calculate how much water you will need to make a 600ml 1:20 solution of disinfectant for your toilet.
16	Calculate the changes in the thoracic cavity if the pressure in the lung changes from +1mmHg to -8mmHg with respect to normal atmospheric pressure of 760mmHg.
17	Convert a pressure reading of 120mm Hg into kPa given that 660mm Hg=87.9kPa.
18	Estimate the cost of running a 800W radiator for 6 hours at a charge of 14 cents kW.

References

Cree & Rishmiller (1989); DiMichael & Raynor (1988); Marieb (1922) and Walpole (1990).

APPENDIX 4

Calculation of Scores for Self-Efficacy for Science (SS) and Sub-Sections

APPENDIX 4

Calculation of Scores for Self-Efficacy for Science (SS) and Sub-Sections

Neutral Science

Comprised of the following 5 items on the SS: 1, 12, 15, 20 and 21. Corresponding questions on the First Year Nursing Students' Survey were: 24, 35, 38, 43 and 44

Calculations

• Neutral Science Total (NST) = sum of 24, 35, 38, 43 and 44.

• Neutral Science Score (NS) = $\frac{NST}{5}$

Feminine Science

Comprised of the following 5 items on the SS: 2, 7, 11, 14 and 19. Corresponding questions on the First Year Nursing Students' Survey were: 25, 30, 34, 37 and 42.

Calculations

• Feminine Science Total (FST) = sum of 25, 30, 34, 37 and 42.

• Feminine Science Score (FS) = $\frac{FST}{5}$.

Masculine Science

Comprised of the following 5 items on the SS: 3, 4, 6, 9 and 13. Corresponding questions on the First Year Nursing Students' Survey were: 26, 27, 29, 32 and 36.

Calculations

• Masculine Science Total (MST) = sum of 26, 27, 29, 32 and 36.

• Masculine Science Score (MS) = $\frac{\text{MST.}}{5}$

Mathematics Science

Comprised of the following 6 items on the SS: 5, 8, 10, 16,17 and 18. Corresponding questions on the First Year Nursing Students' Survey were: 28, 31, 33, 39, 40 and 41.

Calculations

• Mathematics Science Total (MAST) = sum of 28, 31, 33, 39, 40 and 41.

• Mathematics Science Score (MAS) = $\frac{\text{MAST.}}{6}$

Science Score: Self-Efficacy for Science (SS)

Comprised of neutral, masculine, feminine and mathematics science items, that is, 21 items of the SS or questions 24-44 on the First Year Nursing Students' Survey. The overall science score is a measure of a student's self-efficacy for science.

Calculations

• Science Score Total (SST) = sum of 24-44.

• Science Score (SS) = $\frac{\text{SST}}{21}$

APPENDIX 5

Demographic Data for the Cohort

APPENDIX 5

Demographic Data for the Cohort

Variable		Male	Female	Cohort
Mean Age		20.72	21.57	21.46
	n	11	70	81
Type of Study				
Full-Time		11	68	79
Part-Time		0	1	1
	n	11	69	80
Marital Status				
Married/De Facto		1	11	12
Single		10	58	68
	n	11	69	80
Mode of Entry				
HSC/TER		9	48	57
TAFE		0	1	1
MAE		2	11	13
Other		0	10	10
	n	11	70	81
Birthplace				
Aust/NZ/UK		11	65	76
Other		0	4	4
	n	11	69	80
Language Spoken at home				
English		10	65	75
Other		1	5	6
	n	11	70	81
Mothers' Birthplace				
Aust/NZ/UK		10	58	68
Other		1	12	13
	n	11	70	81
Fathers' Birthplace				
Aust/NZ/UK		6	52	58
Other		4	15	19
	n	11	67	77

APPENDIX 6

Social Characteristics of the Cohort

APPENDIX 6

Social Characteristics of the Cohort

Variable	Mother			Father		
	Males	Females	Cohort	Males	Females	Cohort
Parents' Education						
Degree	6	15	21	3	18	21
Trade Qualification/ Certificate/Diploma	0	11	11	5	24	29
Secondary School	2	16	180	0	9	9
Did Not Complete Secondary School	3	25	28	3	15	18
n	11	67	78	11	66	77
Parents' Occupation						
1. Managerial/ Administrators	0	3	3	1	10	11
2. Professional	2	11	13	1	18	19
3. Para-Professional	1	0	1	1	4	5
4. Tradespersons	0	1	1	1	12	13
5. Clerks	1	8	9	0	2	2
6. Salespersons/Personal Service Workers	1	2	3	1	0	1
7. Plant & Machine Operators and Drivers	0	0	0	0	6	6
8. Labourers & Related Workers	1	6	7	3	6	9
9. Home Duties	3	18	22	0	0	0
10-11, 13-16. Not employed*	1	6	7	2	7	9
12. Nursing	1	12	13	1	1	2
n	11	67	78	11	66	77

* Includes Retired, Invalid, Deceased, Unknown, Student and Pension

APPENDIX 6

Social Characteristics of the Cohort (continued)

Variable		Males	Females	Cohort
Type of Secondary School Attended				
State/Public		7	45	52
Private (Catholic)		3	18	21
Private (Other)		1	6	7
	n	11	69	80
Co-Educational School				
Yes		8	57	65
No (Boys' school)		3	-	3
No (Girls' school)		-	12	12
	n	11	69	80
Financial Support				
Part-Time/Casual Work		4	34	38
Parents/Guardian		6	28	34
Own Investment		0	13	13
Spouse		1	9	10
Other		1	3	4
Loans/Credit		0	2	2
Scholarship/Cadetship		0	1	1

(Multiple Answers)

APPENDIX 7

Vocational Choice and the Cohort

APPENDIX 7

Vocational Choice and the Cohort

Variable	Cohort n = 81	Females n = 70	Males n = 11
Major Reason for Choosing Nursing			
Personal Satisfaction	26	22	4
To Care for Others	22	22	0
Establish Good Career	18	16	2
TER Score insufficient	8	3	3
Improve Job Chances	3	2	1
Other	3	2	1
Unhappy in Previous Job	1	1	0
Parents' Expectations	0	0	0
Course as First Preference			
Yes	58	51	7
No	23	19	4
Decision to Nurse Made			
Last Year	34	28	6
1 - 2 years ago	21	21	0
3 - 4 years ago	12	8	4
More than 5 years ago	14	13	1

APPENDIX 8

Summary Statistics for AN Items by Gender

APPENDIX 8

Summary Statistics for AN Items, by Gender

AN		Min	Max	Mean	SD
1 Caring for sick people					
	Cohort	3.00	5.00	4.64	0.55
	F	3.00	5.00	4.70	0.49
	M	3.00	5.00	4.27	0.79
2 Nursing is interesting					
	Cohort	1.00	5.00	3.95	0.77
	F	2.00	5.00	3.99	0.69
	M	1.00	5.00	3.73	1.19
3* Relatives of patients					
	Cohort	1.00	5.00	3.75	1.04
	F	1.00	5.00	3.81	1.02
	M	1.00	5.00	3.36	1.12
4 Nursing involves teamwork					
	Cohort	3.00	5.00	4.86	0.44
	F	3.00	5.00	4.84	0.47
	M	3.00	5.00	5.00	0
5* Nurses need to understand reasons for patients' actions					
	Cohort	1.00	5.00	4.65	0.44
	F	1.00	5.00	4.62	0.79
	M	1.00	5.00	4.82	0.40
6 Helping a patient recover					
	Cohort	3.00	5.00	4.84	0.43
	F	3.00	5.00	4.84	0.41
	M	3.00	5.00	4.82	0.60
7 Explaining a procedure					
	Cohort	1.00	5.00	4.05	0.83
	F	2.00	5.00	4.09	0.77
	M	1.00	5.00	3.82	1.17
8 Talking to a patient					
	Cohort	3.00	5.00	4.54	0.67
	F	3.00	5.00	4.51	0.70
	M	4.00	5.00	4.73	0.47
9 Nursing is exciting					
	Cohort	3.00	5.00	3.78	0.63
	F	3.00	5.00	3.80	0.65
	M	3.00	4.00	3.64	0.50

Cohort n = 81
F n = 70 (except * n = 69)
M n = 11

APPENDIX 9

Spearman Correlation between BSRI Scores and SS, by Gender

APPENDIX 9

Spearman Correlation Between BSRI Scores and SS, by Gender

BSRI Scores	SS	NS	MS	FS	MAS
Masculinity					
Cohort n = 81	0.24*	0.23*	0.23*	0.11	0.15
Males n = 11	0.39	0.49	0.20	0.23	0.40
Females n = 70	0.19	0.20	0.19	0.09	0.08
Femininity					
Cohort	0.00	0.01	0.11	0.07	-0.08
Males	-0.11	-0.47	-0.29	0.07	-0.35
Females	0.11	0.09	0.23*	0.05	0.01
AP					
Cohort	0.11	0.13	0.19	0.13	-0.05
Males	0.04	-0.28	-0.13	0.15	-0.26
Females	0.17	0.19	0.25*	0.11	0.00
UP					
Cohort	-0.10	-0.09	-0.19	-0.10	0.25
Males	-0.13	0.15	0.17	-0.09	-0.03
Females	-0.16	-0.14	-0.26	-0.08	-0.02
MP					
Cohort	0.04	0.02	-0.04	-0.07	0.08
Males	0.40	0.71*	0.47	0.18	0.59*
Females	-0.08	-0.06	-0.19	-0.04	-0.03
FP					
Cohort	-0.21	-0.19	-0.15	-0.02	-0.17
Males	-0.44	-0.71*	-0.43	-0.24	-0.55
Females	-0.11	-0.13	-0.05	-0.04	-0.06

* Statistically significant

APPENDIX 10

Spearman Correlation between Academic Subject Scores/Overall Performance Measures and SS, by Gender

APPENDIX 10

Spearman Correlation Between Academic Subject Scores/ Overall Performance Measures and SS, by Gender

Subjects	SS Cohort	Females	Males
First Session			
SCIE110	0.49*	0.35	0.79
n = Cohort 64, F55, M9	0.0001*	0.008*	0.01*
NURS121(1)	0.28	0.35	0.16
n = Cohort 66, F57, M9	0.02*	0.007*	0.69
NURS122(1)	0.09	0.09	0.16
n = Cohort 65, F56, M9	0.47	0.56	0.69
NURS123	0.24	0.23	0.64
n = Cohort 64, F55, M9	0.06	0.08	0.07
Second Session			
SCIE111	0.43	0.35	0.75
n = Cohort 60, F52, M8	0.0005*	0.01*	0.03*
NURS121(A)	0.21	0.24	0.43
n = Cohort 64, F55, M9	0.10	0.07	0.25
NURS122(A)	0.03	0.01	0.29
n = Cohort 60, F53, M7	0.03	0.01	0.29
NURS124	0.13	0.08	0.58
n = Cohort 60, F51, M9	0.32	0.58	0.09
Academic Performance Measures			
WAM	0.29	0.24	0.65
n=Cohort 66, F57, M9	0.02*	0.07	0.06
GPA	0.33	0.23	0.78
n= Cohort 66, F57, M9	0.007*	0.08	0.01*

*Statistically Significant

APPENDIX 11

HSC Science/Mathematics Background of Students

APPENDIX 11

HSC Science/Mathematics Background of Students

HSC Subject	Male	Female	Total
Science			
Chemistry	5	18	23
Physics	2	4	6
Biology	2	26	28
General Science	0	2	2
Mathematics			
Maths 1 Unit*	2	17	19
Maths 2 Units	3	17	20
Maths 3-4 Units	1	9	10

* Also includes: Maths in Society, Maths in Space and Advanced Maths

APPENDIX 12

Association between Interest and Self-Efficacy for First Year Subjects (SEFFYS)

APPENDIX 12

Association Between Interest and Self-Efficacy for First Year Subjects (SEFFYS)

Subject	SEFFYS %	Interest %
	High (4, 5)	High (4, 5)
NURS121	64	84
NURS122	53	60
SCIE110	35	44
NURS124	30	20
	Low (1, 2, 3)	Low (1, 2, 3)
NURS121	36	16
NURS122	47	40
SCIE110	65	56
NURS124	70	80

APPENDIX 13

Chi-Square Table of Nursing as a First Preference (Q22) and Academic Grades for NURS121(A)

APPENDIX 13

Chi-Square Table of Nursing as a First Preference (Q22) and Academic Grades for NURS121(A)

	Academic Grades NURS121(A) %				
Q22	Fail/Pass	Credit	Distinction	High Distinction	Total
Yes	12.77	38.30	40.43	8.50	100.00
	n = 6	n = 18	n = 19	n = 4	n = 47
No	23.53	47.06	29.41	0.00	100.00
	n = 4	n = 8	n = 5	n = 0	n = 17

Statistics for Association between Q22 and Academic Grades for NURS121(2)			
Chi-Square	DF	Value	p
	3	3.01	0.39

APPENDIX 14

First Year Nursing Students' Survey 1994

APPENDIX 14

UNIVERSITY OF WOLLONGONG

FIRST YEAR NURSING STUDENTS' SURVEY 1994

Purpose

This survey will help identify factors that influence results in the first year of an undergraduate nursing course. Your information can help nursing students by determining which factors are important. This will assist in developing ways to improve university nursing courses.

Confidentiality

All information provided will be kept strictly confidential and anonymous. The survey has been approved by the University Of Wollongong Human Research Ethics Committee. While your contribution will be extremely valuable, participation in the survey is voluntary. Thank you for your opinions and time taken to complete this questionnaire.

What You Need To Do

Everyone's opinion is useful whether it is positive, negative or neutral. Please read each question carefully.

Select your answer from the categories provided to give the answer that best fits you.

Please tick or number the relevant box or boxes, preferably using a black or blue pen.

Sharon Andrew,
MSc(Hons) student,
Department of Nursing,
University of Wollongong.

Below are set of statement about nursing. Please indicate on the scale your attitude towards each of these statements by ticking the appropriate box.

	1	2	3	4	5	
1 Caring for sick people is:						
	Tedious					**Rewarding**
	❑	❑	❑	❑	❑	
2 Nursing is interesting:						
	Sometimes					**Always**
	❑	❑	❑	❑	❑	
3 Relatives of patients are:						
	Demanding					**Need Reassuring**
	❑	❑	❑	❑	❑	
4 Nursing involves team work:						
	Never					**Often**
	❑	❑	❑	❑	❑	
5 Nurses need to understand the reasons for a patient's actions:						
	On some occasions					**On most occasions**
	❑	❑	❑	❑	❑	
6 Helping a patient recover from an illness is:						
	Not Personally Satisfying					**Personally Satisfying**
	❑	❑	❑	❑	❑	
7 Explaining a procedure to a patient is:						
	Mundane					**Challenging**
	❑	❑	❑	❑	❑	
8 Talking to a patient is:						
	Boring					**Interesting**
	❑	❑	❑	❑	❑	
9 Nursing is exciting:						
	Rarely					**Always**
	❑	❑	❑	❑	❑	

I would like to find out your expectations for some of your first year subjects.
Please indicate on the scale your confidence in completing the following subjects with a grade of credit or better, by ticking the relevant box.

Subject	Not Confident 1	2	3	4	Very Confident 5
10 NURS121 (Foundations of Nursing Care)	❑	❑	❑	❑	❑
11 NURS122 (Professional Studies)	❑	❑	❑	❑	❑
12 NURS124 (Introduction to Research)	❑	❑	❑	❑	❑
13 SCIE111 (Human Bioscience 2)	❑	❑	❑	❑	❑

Please indicate your degree of interest in the following subjects, by ticking the relevant box.

Subject	Strongly Interested 1	2	3	4	Strongly Disinterested 5
14 NURS121 (Foundations of Nursing Care)	❑	❑	❑	❑	❑
15 NURS122 (Professional Studies)	❑	❑	❑	❑	❑
16 NURS124 (Introduction to Research)	❑	❑	❑	❑	❑
17 SCIE111 (Human Bioscience 2)	❑	❑	❑	❑	❑
18 SCEI110 (Human Bioscience 1)	❑	❑	❑	❑	❑
19 NURS123 (Introductory Psychology for Nurses)	❑	❑	❑	❑	❑

20 How confident are you about completing your nursing degree?

Not Confident				Very Confident
1	2	3	4	5
❑	❑	❑	❑	❑

I would like to know about some of the factors influencing your choice of nursing as a field to study at University.

21 What is the *major* reason you decided to do a Nursing course? *(Tick one box)*

1 ❑ Personal satisfaction
2 ❑ I wanted to establish a good career
3 ❑ Following my parents' expectations
4 ❑ Unhappy with my previous job
5 ❑ Improving my chances of getting a job
6 ❑ Opportunity to care for others
7 ❑ TER score insufficient for other courses
8 ❑ Other *(Please specify)* _____

22 Was this course your first preference? *(Tick one)*

1 ❑ Yes
2 ❑ No

23 When did you decide on nursing as a career? *(Tick one)*

last year	❑ 1
1-2 years ago	❑ 2
3-4 years ago	❑ 3
more than 5years ago	❑ 4

Below are descriptions of some science tasks. Please indicate on the scale the confidence you have in your ability to successfully perform each of these tasks by ticking the appropriate box.

24 Dissolve sugar in a drink by changing the drink's temperature.

Not confident				Very confident
❑	❑	❑	❑	❑

25 Read a cake recipe and decide what the raising agents are.

Not confident				Very confident
❑	❑	❑	❑	❑

26 Work out if a 120V electric razor (bought in the U.S.A.) would work if plugged into your electrical powerpoint.

Not confident				Very confident
❑	❑	❑	❑	❑

27 Determine why the rake you left out in the rain has gone rusty.

Not confident				Very confident
❑	❑	❑	❑	❑

28 Calculate whether the 4kW electrical circuit in your kitchen will enable you to run a 2.4kW space heater, 600W toaster and a 1200W kettle.

Not confident				Very confident
❑	❑	❑	❑	❑

29 Make a paper dart and choose a shape that will make it fly faster.

Not confident				Very confident
❑	❑	❑	❑	❑

30 Decide whether a still or windy day is better for drying your clothes.

Not confident				Very confident
❑	❑	❑	❑	❑

31 Convert John's dietary intake of 2500cal to kJ given that 1 calorie=4.185J.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

32 Decide whether oiling your bicycle will make it go slower or faster.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

33 Calculate how much water you will need to make a 600ml 1:20 solution of disinfectant for your toilet.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

34 Work out if a white spot on your overalls, caused by splashing it with bleach, can be removed by machine washing.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

35 Give examples of an electrical conductor and insulator.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

36 Figure why the aircraft moving away from you has a lower frequency compared with its frequency when overhead.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

37 Decide whether covering a water filled saucepan with a lid will increase or decrease the time it will to boil.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

38 Suck some water up in a straw and work out how to keep it in the straw.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

39 Calculate the changes in the thoracic cavity if the pressure in the lung changes from +1mmHg to -8mmHg with respect to normal atmospheric pressure of 760mmHg.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

40 Convert a pressure reading of 120mmHg into kPa given that 660mmHg=87.9kPa.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

41 Estimate the cost of running a 800W radiator for 6 hours at a charge of 14 cents

Not confident Very confident

❑ ❑ ❑ ❑ ❑

42 Choose whether it would be sensible to wear smooth soled or ripple soled shoes to a wet football oval.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

43 Understand why water droplets are running down the inside of a misty window pane on a cold day.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

44 Decipher a can labelled "contains baked beans, sucrose, and sodium chloride" to see if it contains salt and sugar.

Not confident Very confident

❑ ❑ ❑ ❑ ❑

Below are some personality characteristics. Indicate on a scale of one to seven how well each of these statements describes yourself, by ticking the appropriate box.

Statement	Never or almost never true 1	2	3	4	5	6	Always or almost always true 7
45 Self reliant.	❑	❑	❑	❑	❑	❑	❑
46 Yielding	❑	❑	❑	❑	❑	❑	❑
47 Willing to defend your beliefs	❑	❑	❑	❑	❑	❑	❑
48 Cheerful.	❑	❑	❑	❑	❑	❑	❑
49 Independent.	❑	❑	❑	❑	❑	❑	❑
50 Shy.	❑	❑	❑	❑	❑	❑	❑
51 Athletic.	❑	❑	❑	❑	❑	❑	❑
52 Affectionate.	❑	❑	❑	❑	❑	❑	❑
53 Assertive.	❑	❑	❑	❑	❑	❑	❑
54 Like to be flattered.	❑	❑	❑	❑	❑	❑	❑
55 Have a strong personality.	❑	❑	❑	❑	❑	❑	❑
56 Loyal.	❑	❑	❑	❑	❑	❑	❑
57 Forceful.	❑	❑	❑	❑	❑	❑	❑
58 Feminine.	❑	❑	❑	❑	❑	❑	❑
59 Analytical.	❑	❑	❑	❑	❑	❑	❑

Statement	Never or almost never true 1	2	3	4	5	6	Always or almost always true 7
60 Sympathetic	❑	❑	❑	❑	❑	❑	❑
61 Have leadership qualities.	❑	❑	❑	❑	❑	❑	❑
62 Sensitive to the needs of others.	❑	❑	❑	❑	❑	❑	❑
63 Willing to take risks.	❑	❑	❑	❑	❑	❑	❑
64 Understanding.	❑	❑	❑	❑	❑	❑	❑
65 Able to make decisions easily.	❑	❑	❑	❑	❑	❑	❑
66 Compassionate.	❑	❑	❑	❑	❑	❑	❑
67 Self-sufficient.	❑	❑	❑	❑	❑	❑	❑
68 Eager to soothe hurt feelings.	❑	❑	❑	❑	❑	❑	❑
69 Dominant.	❑	❑	❑	❑	❑	❑	❑
70 Soft spoken.	❑	❑	❑	❑	❑	❑	❑
71 Masculine.	❑	❑	❑	❑	❑	❑	❑
72 Warm.	❑	❑	❑	❑	❑	❑	❑
73 Willing to take a stand.	❑	❑	❑	❑	❑	❑	❑
74 Tender.	❑	❑	❑	❑	❑	❑	❑

Statement	Never or almost never true 1	2	3	4	5	6	Always or almost always true 7
75 Aggressive.	❑	❑	❑	❑	❑	❑	❑
76 Guillable.	❑	❑	❑	❑	❑	❑	❑
77 Willing to act as leader.	❑	❑	❑	❑	❑	❑	❑
78 Childlike.	❑	❑	❑	❑	❑	❑	❑
79 Indivualistic.	❑	❑	❑	❑	❑	❑	❑
80 Do not use harsh language.	❑	❑	❑	❑	❑	❑	❑
81 Competitive.	❑	❑	❑	❑	❑	❑	❑
82 Love children.	❑	❑	❑	❑	❑	❑	❑
83 Ambitious.	❑	❑	❑	❑	❑	❑	❑
84 Gentle.	❑	❑	❑	❑	❑	❑	❑

To assist in the analysis of the survey, I would like some basic information about yourself.

85 What is your gender? *(Tick one)*

1 ❑ Male *(now go to 88)*
2 ❑ Female

86 Would you call yourself a feminist? *(Tick one)*

1 ❑ Yes
2 ❑ No

87 Do you use the title Ms.? *(Tick one)*

1 ❑ Yes
2 ❑ No

88 Age (at 1st March, 1994): ❑❑ years

89 Type of Student: *(Tick one)* 1 ❑ Full Time 2 ❑ Part Time

90 What is your marital status? *(Tick one)*

1 ❑ Single
2 ❑ Married/Defacto

91 How did you gain entry into University? *(Tick one)*

1 ❑ HSC/TER (or equivalent) *(Now go to 92)*
2 ❑ TAFE qualifications *(Now go to 94)*
3 ❑ Mature Age Entry *(Now go to 95)*
4 ❑ Other (Please Specify) _____ *(Now go to 95)*

92 What was your TER score? ❑❑❑

93 What subjects did you study for your HSC/TER?

Subjects	**Score or Grade obtained**
_____	❑❑
_____	❑❑
_____	❑❑
_____	❑❑
_____	❑❑
_____	❑❑ *(Now go to 95)*

94 What T.A.F.E. subjects did you study?

Subjects	**Score or Grade obtained**
_____	❑❑
_____	❑❑
_____	❑❑
_____	❑❑
_____	❑❑

95 What type of secondary school did you attend in your final year? *(Tick one)*

1 ❑ State/Public
2 ❑ Private (Catholic)
3 ❑ Private (Other)

96 Was your secondary school a co-educational school? *(Tick one)*

1 ❑ Yes (co-educational)
2 ❑ No (a boys school)
3 ❑ No (a girls school)

97 Where were you born? *(Tick one)*

1 ❑ Australia/New Zealand/U.K.
2 ❑ Other

98 What is the usual language spoken at your home? *(Tick one)*

1 ❑ English
2 ❑ Other

99 What is the birthplace of your parents? *(Tick one for each parent)*

	Mother	*Father*
Australia/NZ/UK	1❑	1❑
Other	2❑	2❑

100 What is your mother's and father's occupation?

Father's occupation (please specify) _____

*Mother's occupation (please specify)*_____

101 What are your Father's and Mother's highest level of education? *(Tick one for each parent)*

	Father	*Mother*
Degree	❑	❑
Trade qualification/Certificate/Diploma	❑	❑
Completed highest level of secondary school available	❑	❑
Did not complete highest level of secondary school available	❑	❑

102 What are your *major* sources of financial support while you attend university? *(Tick one or more)*

1 ❑ Own Savings/Investments
2 ❑ Parents/Guardian
3 ❑ Full-Time Work
4 ❑ Part-Time/Casual Work
5 ❑ Scholarship/Cadetship
6 ❑ Austudy/Abstudy
7 ❑ Spouse
8 ❑ Loans/Credit
9 ❑ Other

103 *To analyse the factors influencing university results, information about your grades are needed. This information will be stored separately from your questionnaire which will be coded for confidentiality and anonymity and used only in statistical analysis. I need your signature so that I can obtain your grades/mark for your first year subjects.*

I agree to participate in this survey, including the collection of my grades
and/or mark for all my first year subjects.
Student No._____ Student Signature._____

You have the right to withdraw your consent for this survey at any time.
Enquires about the conduct of the research can be made to the Secretary of the University of Wollongong Human Research Ethics Committee.